WBS-2400 and WBS-2400-SCT User Manual

SW version 4.0

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FCC Notice to Users and Operators

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by using one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.

This Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any changes or modification to said product not expressly approved by Wavion could void the user's authority to operate this device.

WARNING: It is illegal to modify the construction of this product. Modifying the operating frequency or enhancing the transmit output power through the use of external amplifiers or other equipment is specifically disallowed by the "Telecommunications Act."

WARNING: This device is for outdoor use with conditions that no harmful interference to authorized radio stations results from the operation of this device. This device shall not influence aircraft security and/or interfere with legal communications as defined in the "Telecommunications Act." If this device is found to cause interference, the operator of this equipment shall cease operating this device immediately until no interference is achieved.

NOTE: This device must be installed by a trained professional, value added reseller or systems integrator who is familiar with RF planning issues and the regulatory limits in the United States of America.

READ THIS FIRST!

Important Safety Instructions

CAUTION: The exclamation point within a triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

WARNING: The lightning flash with an arrowhead symbol within a triangle is intended to alert the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

CAUTION: Read and save these instructions. Heed all warnings. Follow all instructions.

CAUTION: Do not defeat the safety purpose of the grounding. Only use attachments/ accessories specified by the manufacturer.

CAUTION: Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way. For example, if the power-supply cord or plug is damaged, liquid has been spilled on the apparatus, objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, it does not operate normally, or has been dropped.

WARNING: There is a risk of personal injury or death if the WBS-2400 antennas come near electric power lines. Carefully read and follow all instructions in this manual. By nature of the installation, you may be exposed to hazardous environments and high voltage. Use caution when installing the outdoor system.

WARNING: This apparatus must be connected to earth ground.

WARNING: Do not open the unit. There is a risk of electric shock inside.

CAUTION: You are cautioned that any change or modification not expressly approved in this manual could void your authority to operate this equipment.

CAUTION: There are no user-serviceable parts inside. All service must be performed by qualified personnel.

CAUTION: The RJ45 connectors of your Wavion WBS-2400 may source DC power on pins 4,5 and 7,8. The IEEE 802.3 standards allow for pins 4,5 and 7,8 to be used for Power Over Ethernet. Some products may be incompatible with the Wavion Power Over Ethernet capability. If such problems occur, make sure that the unit is configured with the Power Over Ethernet capability set to Off (default setting). If problems persist, use Ethernet cables that have no connections to the unused pins 4,5 and 7,8.

CAUTION: The Wavion WBS-2400 and WBS-2400-SCT can be installed in wet, outdoor locations. Make sure closure caps are installed and all cable connections are securely fastened and waterproofed.

CAUTION: The Wavion WBS-2400 can only be used with approved antennas.

About This Manual

The following describes configuration of the WBS-2400 and WBS-2400-SCT. It is intended for use by network engineers and administrators charged with setting up and administering Wavion wireless networks. This manual contains the following:

- Chapter 1: Viewing the System Status: Explains the Home page with its summary of the system status.
- Chapter 2: Managing the System Configuration: Explains how to configure the system, upgrade the software version and install SDMA feature. Contains detailed information about the system's modules.
- Chapter 3: Managing Network Interfaces: Allows configuration of the Ethernet and wireless interfaces.
- Chapter 4: SSID and VLAN Configuration: Explains how to configure BSSID and VLAN, contains detailed information and the relationship between them.
- Chapter 5: Viewing Associated Stations: Lists the associated stations and their configuration into VLAN.
- Chapter 6: Managing System and Station Security: Explains how to configure new users, passwords, SNMP and HTTPS configuration.
- Chapter 7: Viewing Events: Explains how to view and configure the system event logs.
- Chapter 8: Upgrading the System Software: Provides detailed instructions for upgrading the system software version.
- Chapter 9: Appendix: Troubleshooting: Provides tips on dealing with possible questions you may have in working with the WBS-2400 and WBS-2400-SCT.

Related documents

The following titles are Wavion Reference documents:

- Installation Guide
- Firmware Upgrade procedure

Contents

Chapter 1 Viewing the System Status **10**
Logging in 10
Logging out 10
StartUp wizard 10
Viewing the Home Page 13
To view the Home page 13
Chapter 2 Managing the System Configuration **15**
Viewing the System Configuration 15
Saving Changes 19
Managing System and Software Configurations 19
Performing Software Upgrades 19
Managing the System Configuration 21
Exporting the Current Startup Configuration File 22
Importing a New System Configuration File 23
Restore to the Factory Default Configuration File 23
Features Licensing- SDMA 23
Installing the SDMA feature 24
Viewing the System Hardware Components 26
Debug Interface 27
Chapter 3 Managing Network Interfaces **30**
Viewing the Network Interfaces Summary 30
Managing the Ethernet Interface 32
Managing the Wireless Interface 33
Setting the Operational Channel 36
Setting the Transmission Power 37
Selecting the Interference Handling Mode 37
Saving Changes 39
Wireless Activity 39
Automatic Channel Selection 42
Backhaul 45
Bridge 57
Chapter 4 SSID and VLAN configuration **61**
IEEE 802.11 and WBS-2400 Security Concepts 61
Security Modes: Authentication and Encryption Methods 61
Authentication Combinations 62
Encryption Methods 62
QoS Packets Priority 63
Configuring WEP Security 72
Configuring WPA Security 74
Configuring RADIUS Server Parameters 74

Configuring WPA2 Security 75
Configuring RADIUS Server Parameters 75
VLAN Configuration 76
Tagging VLAN 76
Configuring VLAN 77
Configuring Multiple VLANS per SSID 79
Management VLAN 81
Chapter 5 Viewing Associated Stations **82**
Viewing Stations 82
Viewing Associated Stations 83
Viewing Specific Stations 84
MAC Filtering 90
Chapter 6 Managing System and Station Security **92**
Viewing the Security Page 92
Viewing the Management Configuration Page 93
HTTP Configuration 96
Viewing the Authentication Pages 96
Chapter 7 Viewing Events **99**
Viewing the Most Recent Events 99
Viewing the Full Event Log 100
Navigating the Event Log 101
Configuring Event Logs 102
Chapter 8 Upgrading the System Software **105**
Prerequisites 105
Tools and data required for upgrade: 105
Firmware Upgrade Procedure 106
Roll back procedure 111
To return to the system default software version 111
Chapter 9 Appendix: Troubleshooting **113**
Basic Troubleshooting 113
LED Description 114

Introduction

Wavion is glad to have the opportunity to offer the WBS2400 family of products as the best wireless coverage solution for your project requirements. Wavion's next-generation base stations, referred to as spatially adaptive WiFi Base Stations, are designed specifically to address shortcomings in current outdoor access points for rural and metro WiFi applications. Wavion's powerful digital beam-forming and space division multiple access (SDMA) technologies - the next-generation of multiple-antenna technology - address limitations in coverage, penetration, and capacity of existing WiFi technology, and provide significant performance and cost advantages compared to current conventional WiFi solutions.

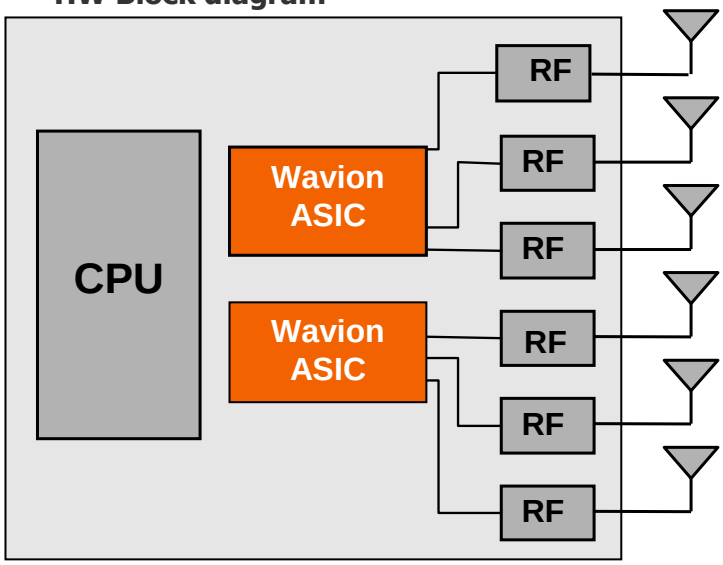
The WBS2400 and WBS-2400-SCT Base Stations

WBS2400 Key Benefits:

- Exceptional coverage, range, throughput, network capacity, scalability, and reliability
- Excellent building and wall penetration
- Uniform coverage and enhanced non-line-of-sight operation
- High interference resilience
- Enhanced mobility support
- Simple deployment and low infrastructure and operating costs
- Full compatibility with standard 802.11b/g clients

Figure 1.1: Shows the relationship between the WBS-2400 hardware modules.

Figure 1.1 **HW Block diagram**



- CPU – Control and synchronize the whole system performance
- Wavion ASIC - Smart RF technology resides in the ASIC and software
- WBS-2400- Six RF modules and Antennas - Standard off-the-shelf components and antennas
- WBS-2400-SCT -Three RF modules and Antennas- Standard off-the-shelf components
- Wired Data – 10/100 Base-T Ethernet terminals with POE in or optional output.

Chapter 1

Viewing the System Status

The Home page shows a summary of status data of the system. From within this page, you can quickly link from fields to other related pages for more information.

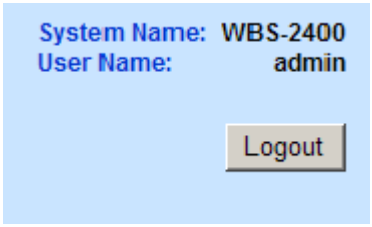
Logging in

The default IP address of the unit is IP: 192.168.1.1 and mask: 255.255.255.0.

To log-in, type "admin" in the username field, and "admin" in the password field.

Logging out

Is possible to log-out at any time by pressing the "Logout" button on the upper right-hand side of the screen.



StartUp wizard

Upon login, the start-up wizard appears. This wizard is composed of 3 pages:

- ◊ Quick Installation guide
- ◊ IP Address Configuration
- ◊ Automatic Channel Selection

Moving to one page to the other is done by pressing the "Next" button. From the "IP setting" page is possible to skip the Wizard. The wizard stops after the ACS. The page shown is the ACS results, where is possible to check the status of the spectrum around the WBS area.

The wizard will be activated every login. To deactivate the wizard go to the "System " menu page and disable the Wizard through the "Startup Wizard" drop-down list at the bottom of the page.

Figure 1.2 **Quick Installation Guide**

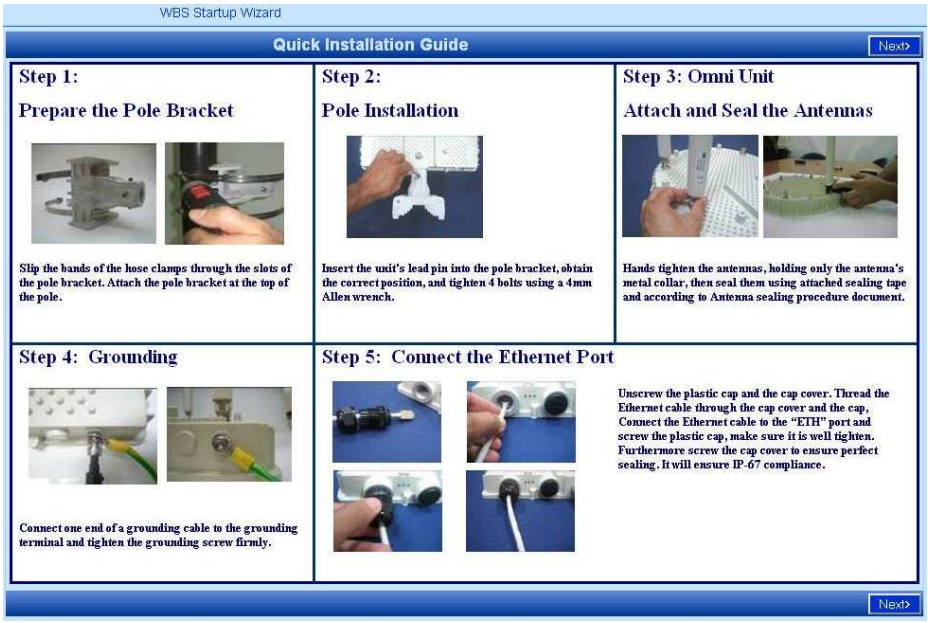
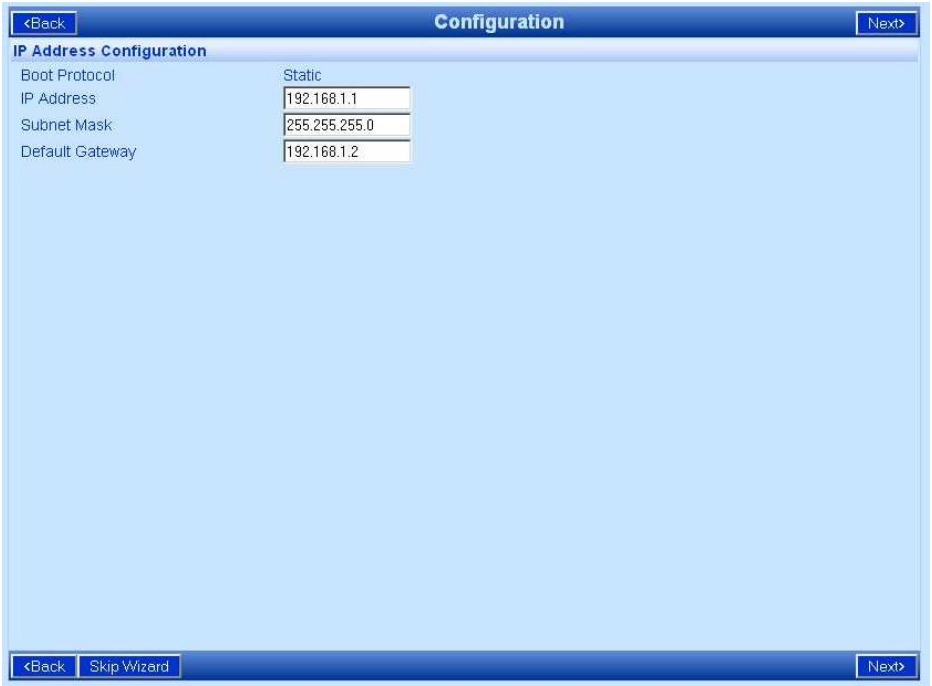
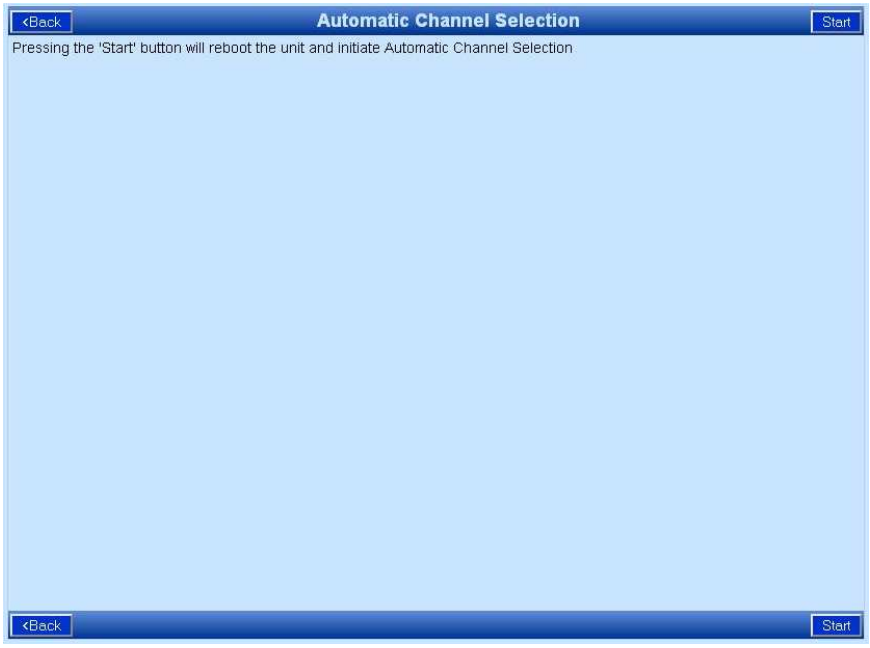

WBS Startup Wizard
Quick Installation Guide
Next>
Step 1:
Prepare the Pole Bracket
Slip the bands of the hose clamps through the slots of the pole bracket. Attach the pole bracket at the top of the pole.
Step 2:
Pole Installation
Insert the unit's lead pin into the pole bracket, obtain the correct position, and tighten 4 bolts using a 4mm Allen wrench.
Step 3: Omni Unit
Attach and Seal the Antennas
Hands tighten the antennas, holding only the antenna's metal collar, then seal them using attached sealing tape and according to Antenna sealing procedure document.
Step 4: Grounding
Connect one end of a grounding cable to the grounding terminal and tighten the grounding screw firmly.
Step 5: Connect the Ethernet Port
Unscrew the plastic cap and the cap cover. Thread the Ethernet cable through the cap cover and the cap, Connect the Ethernet cable to the "ETH" port and screw the plastic cap, make sure it is well tighten. Furthermore screw the cap cover to ensure perfect sealing. It will ensure IP-67 compliance.
Next>

Figure 1.3 **IP Address Configuration**



You can skip the Wizard in this page by pressing the "Skip Wizard" button.

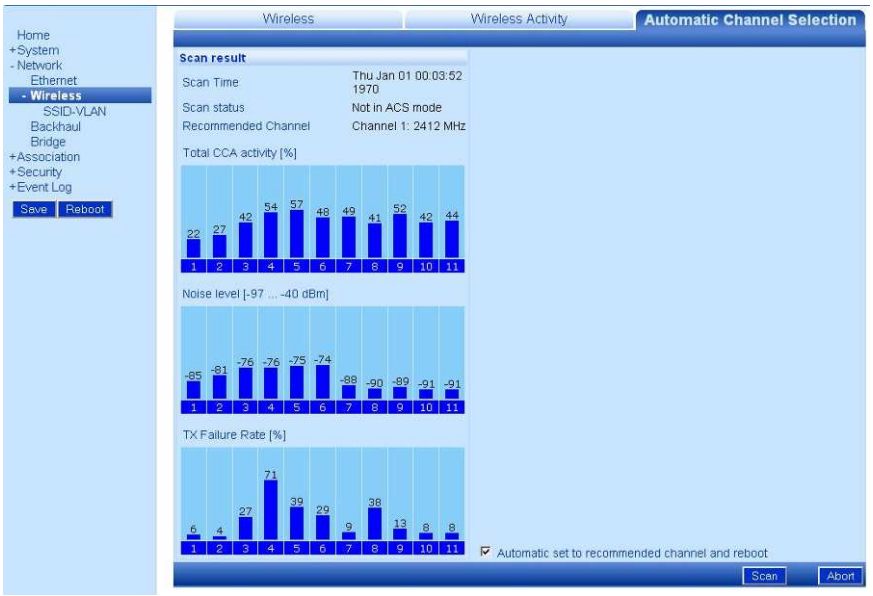
Figure 1.4 **Automatic Channel Selection**



After pressing "Start" a channel scanning will be performed.

The last page of the wizard is the ACS results. From this page starts the normal functionality of the GUI.

Figure 1.5 **Automatic Channel Selection**



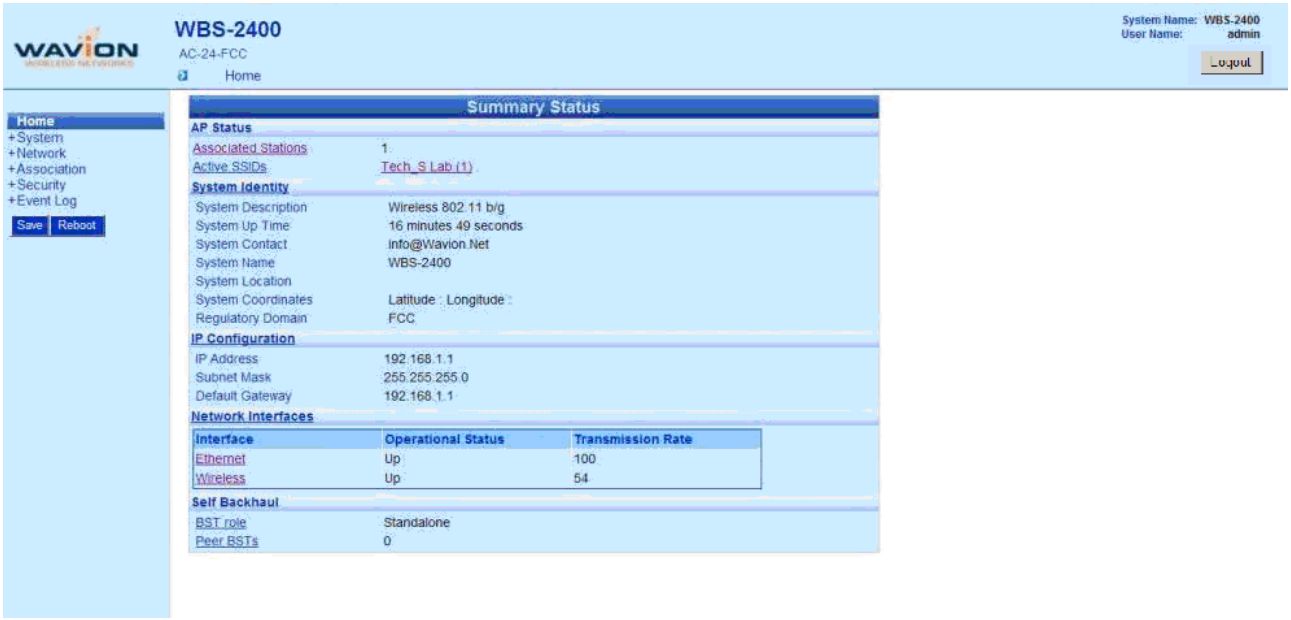
Viewing the Home Page

To view the Home page

- Click Home.

The Summary Status page is displayed.

Figure 1.6 **Home: Summary Status Page**



The following fields appear on the Summary Status page:

Table 1.1 **Home: Summary Status Page**

Field	Description
BST Status	
Associated Stations	Links to Associated Stations page
Active SSID	Service Set Identifier; links to Editing SSID page

Table 1.1 **Home: Summary Status Page**

Field	Description
System Identity	Links to System Configuration page
System Description	Description of the device as written in MIB-II SysDescr OID
System Up Time	Total time since system was switched on or last re-initialized
System Contact	Administratively-assigned email address of system operator
System Name	Administratively-assigned name for this managed node; the node's fully-qualified domain name.
System Location	Administratively-assigned physical location of this node (e.g. 'telephone closet, 3rd floor')
System Coordinate	Display the unit's Latitude and Longitude
Regulatory Domain	Display the unit regulatory domain according to 802.11d
IP Configuration	Links to System Configuration page
IP Address	The current IP address of the unit
Subnet Mask	The current subnet mask used to establish the broadcast domain.
Default Gateway	The current IP address of the default gateway.
Network Interfaces	Links to Network Interfaces Summary page
Network Interfaces	Links to interfaces configuration page • Ethernet • Wireless
Operational Status	Up/down
Transmission Rate	Maximum transmission rate on the interface in Mbps
Self Backhaul	
BST role	Display current BST self backhaul configuration and link to the configuration page
Peer BST	Display number of connected peers and link to the connected BST page

Chapter 2

Managing the System Configuration

The System Configuration page displays system identification parameters like, IP information, system location servers etc. The other system pages allow updating of the software version and system configuration, and a view of the system components.

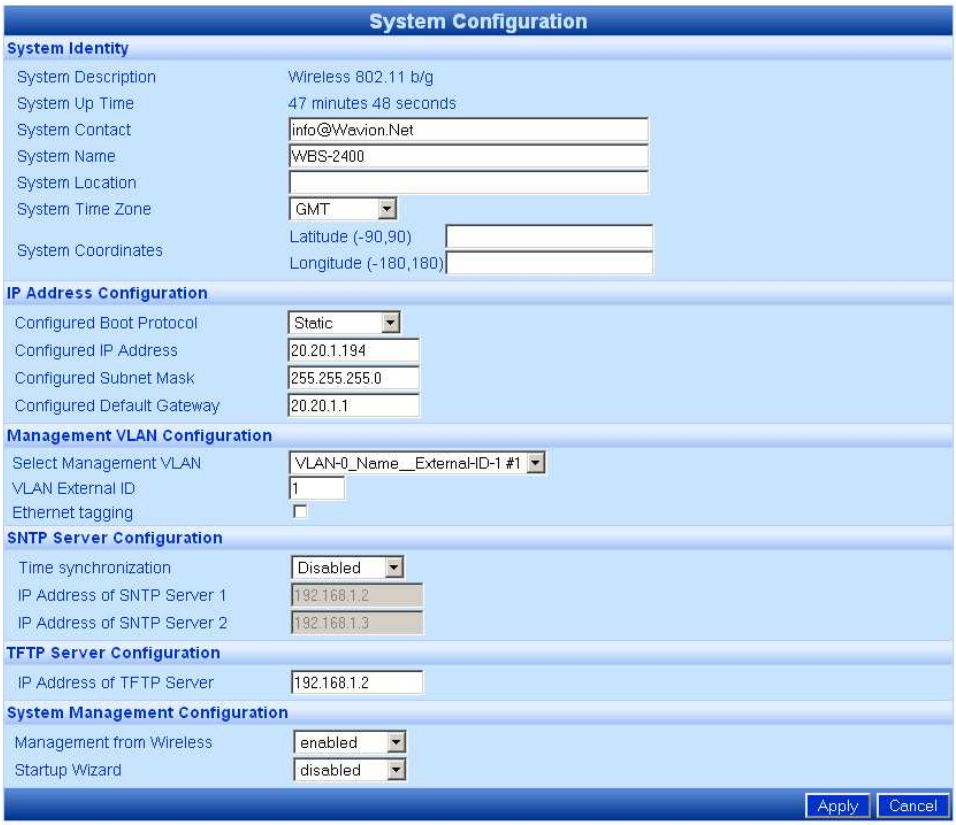
Viewing the System Configuration

To view the System Configuration page

- Click the System menu item.

The System Configuration page displays.

Figure 2.1 **System Configuration Page**



The following fields appear on the System Configuration page:

Table- 2.1 System Configuration

Field	Description
System Identity	
System Description	Description of the device as written in MIB-II SysDescr OID
System Up Time	Total time since system was switched on or last re-initialized
System Contact, Name, Location, Time Zone, Coordinates	These parameters are for the user convenience while observing system status via WEB or NMS
IP Address Configuration	
Configured Boot Protocol	Get Static IP or from DHCP server
Configure IP Address, Subnet Mask and Default Gateway	Configure the unit IP parameters
Management VLAN configuration	
Select Management VLAN	List of configured VLAN. Select one as the Management VLAN
VLAN External ID	VLAN ID number configured from the VLAN Switch for Management VLAN traffic.
Ethernet tagging	Enable to VLAN tag all Management traffic
SNTP	Simple Network Time protocol
Time Synchronization	Disable the Time Synchronization or set the Static IP address of the SNTP server or DHCP
IP address of SNTP Servers	Enter the IP address of your desired SNTP servers to sync all system messages to calendar time
Configure TFTP Server	
IP Address of TFTP Server	The IP address of the default TFTP server; can be overridden in the Software Upgrade page for a temporary SW download
System Management Configuration	
Management from Wireless	Enable/Disable
Startup Wizard	Enable/Disable the Startup Wizard

This page contains basic static information on the system, such as contact details, and IP addresses. Several changes are recommended on this page.

Setting System Contact Details

In the System Identity area, in the System Contact field, enter the contact email address of the net owner.

Setting the IP Address Configuration

Change the IP address to allow the full configuration. The Current IP Address Configuration area lists a default IP address; it is possible to perform initial testing with this address, but it is highly recommended to change the IP address.

To change the IP address

In the IP Address Configuration section,

1. For a DHCP obtained address, select DHCP. Following a reboot, the WBS-2400 will automatically obtain and IP address, Subnet mask, and Default Gateway from the DHCP server.
2. To allow entry of a new IP address, select Static from the Configured Boot Protocol dropdown list.
3. In the Configured IP Address field, enter the required IP address.
4. In the Configured Subnet Mask, enter a valid network mask.

Note: The system must be rebooted for these changes to take effect.

Setting the Management VLAN configuration

The purpose of the management VLAN is to segment the Management and the Clients data traffic. It also provides an option for customers to keep an Open SSID for public traffic and simultaneously manage the WBS-2400 traffic over a separate VLAN (that may be linked to a secured SSID). The management VLAN can be selected out of the enabled VLAN list.

Note: Only one VLAN can be defined as the Management VLAN in the WBS-2400 system.

The configuration of the Management VLAN takes effect immediately.

This means that setting the Management VLAN has to be done in 2 steps:

1. Applying the VLAN parameters (external VLAN ID and tagging mode) using the existing management traffic, and selecting the desired VLAN to be the Management VLAN on the Administration page. After this stage the current wire-line connection to the system GUI will drop.
2. Saving the parameters – using the new Management VLAN, i.e. over the tagged VLAN.

To enable VLAN management

1. Apply the VLAN parameters (external VLAN ID and tagging mode) using the existing management traffic or create a new VLAN ID.
2. Select the desired VLAN ID for the Management VLAN traffic.
3. Click Apply and Save

Note: The configuration of the Management VLAN takes effect immediately. Therefore setting the Management VLAN is done over the "old" VLAN (default is VLAN-1 untagged), while saving is done over the "new" VLAN.

The 3rd step in "To enable VLAN management has to be done over a different machine/ the new VLAN.

Setting the System Management Configuration

You can decide to allow system management from the Wireless Interface, or to allow management only from the Ethernet Interface, for security purposes.

To enable or disable system management from the Wireless Interface

In the System Management Configuration area, in the Management from Wireless field, from the dropdown list, select enabled to allow system management from the wireless interface, or Disabled to restrict system management to the Ethernet Interface.

To enable or disable Startup Wizard

From the dropdown list, select "Disabled" to stop performing the Startup Wizard after each login.

Saving Changes

Note: After making changes on this page, you must click both Apply and Save, or the changes do not remain in effect after the next reboot.

1. Click Apply.
2. Click Save.

Managing System and Software Configurations

You can change the system startup configuration, upgrade the software version from the system software tabs and install the SDMA feature license.

To access the system software tabs

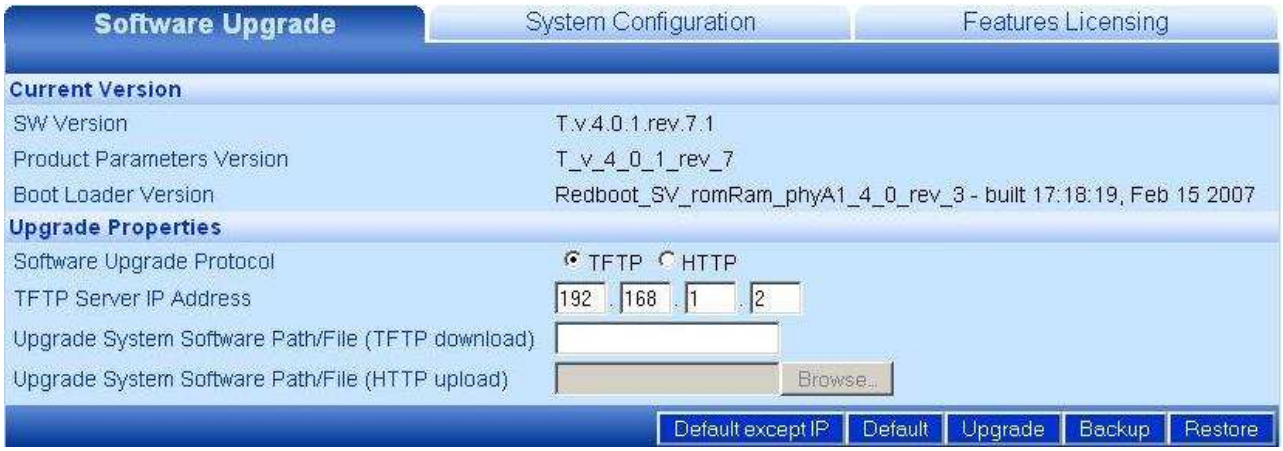
- Click System Software from the menu, as a sub-item of the System menu item.

The system software tabs display, consisting of the Software Upgrade tab for managing the system software version, the System Configuration tab for managing the system configuration, and the Features Licensing tab to install/uninstall the SDMA feature.

Performing Software Upgrades

The Software Upgrade tab shows details about the current software version and allows setting properties required to install a new software version. It is also possible to return to the factory default software, backup the current version of the software and return to a previously backed up version of the software.

Figure 2.2 **Software Upgrade Tab**



Returning to the Default Software Version

You can reinstall the default software version, using one of two options:

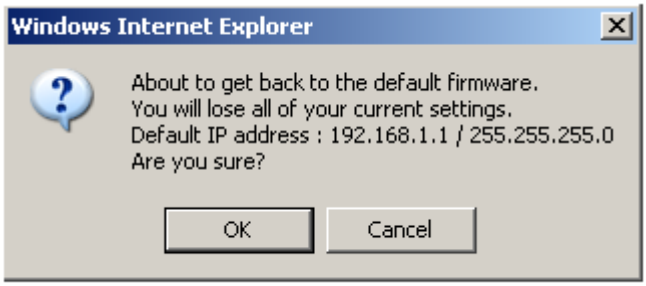
1. Default Except IP – In this case, the unit will lose its current setting without changing the IP address. This option is convenient when choosing to return to default from a remote location.
2. Default – In this case, the unit will lose its current setting and gets system defaults of IP: 192.168.1.1 and mask: 255.255.255.0

To return to the system default software version

1. Click Default or Default Except IP.
2. Click OK

A warning popup displays.

Figure 2.3 **Default Popup**


Windows Internet Explorer
About to get back to the default firmware.
You will lose all of your current settings.
Default IP address : 192.168.1.1 / 255.255.255.0
Are you sure?
OK
Cancel

The system returns to the default software version and default IP and mask settings.

Note: Is possible to return to factory defaults using the reset pushbutton. Press the button firmly until the “STATUS” LED blinks fast with red light (around 40 seconds).

The reset button differs in location according to the WBS HW model:

- ◊ If your WBS has a connection box, the reset pushbutton is located in the box.
- ◊ If your WBS has only ETH and TEST ports, the reset button is located in the PoE injector next to the PoE output port.

The configuration, SW version, and SDMA license status will revert to default.

Upgrading the Software Version

A full description of upgrading the software version is given in upgrading the System Software section in Chapter 7.

Backing Up the Current Software Version

You can backup the software version currently installed on the system. This can be used before upgrading to a new version with which you do not have experience.

To back up the current version of the software

- Click Backup.

The current version of the software is saved, and can be restored to the system if necessary.

Restoring the Last Saved Software Version

If you backed up a software version before upgrading to a new one, it is possible to return to the previous version.

To return to a previous system software version

- Click Restore.

The last backed up version of the system software is restored to the system.

Managing the System Configuration

On the System Configuration tab you can manage current system configuration file name and the configuration management parameters. You can also restore the factory default configuration file, export the current system configuration file, or import a new system configuration file.

Figure 2.4 **System Configuration Tab**

The following fields appear on the System Configuration tab:

Table- 2.2 System Configuration tab

Field	Description
Current Configuration File	
Current Startup Configuration File	File currently used to configure system on startup. This field is also used to export the current configuration file. Right-clicking on the file name allows you to save the current Startup Configuration File on you local disk. See Exporting the Current startup Configuration File.
Import New Configuration File	To import a saved configuration file
Import Protocol TFTP/HTTP	Configuration file can be imported using either TFTP or HTTP protocols
TFTP Server - IP Address...	IP address of the TFTP server, if, for the current downloading, it is not the same as the default TFTP Server. Setting the value here is only relevant for this download and does not hold across a Reboot. The Default TFTP Server is set in the System Configuration page. See Viewing the system Configuration
New Startup Configuration File	Path including the .swcc file being HTTP downloaded; select path using the Browse button which is activated if HTTP is selected as the import protocol
Factory Defaults	Used to restore the factory default startup configuration. Clicking here erases the configuration file that contains all the changes you made to the unit except the unit's IP address. See Restore the Factory defaults
Import System Configuration	Used to import a new startup configuration from a previously saved file. See Importing a New System Configuration file

You have the option of exporting the current startup configuration, importing a new startup configuration or of restoring the factory default configuration file.

Exporting the Current Startup Configuration File

To export the current system configuration

1. Click on the name of the current software configuration.

   A File Download dialog box will appear listing the Name, Type, and From IP address.

A File Download dialog box will appear listing the Name, Type, and From IP address.

A Save As dialog box will appear.

5 Choose the save in folder, create the correct File name, and click on the Save button.

Importing a New System Configuration File

To import a new system configuration

Select the import protocol to be used, either TFTP or HTTP.

If TFTP is selected, enter the IP address of the TFTP server to be used for the download, if it is not the default server.

In the New Startup Configuration File, click Browse and select the file location.

Click Import Startup Configuration.

Note: Do not click Save.

Reboot the system to apply the new configuration.

The new configuration files take effect.

Restore to the Factory Default Configuration File

To restore the factory default configuration file

Click Factory Defaults.

Note: This procedure erases the configuration file that contains all the changes you made to the unit except the IP address.

Note: Do not click Save.

Reboot the system to apply the factory default configuration.

Features Licensing- SDMA

On the Features Licensing tab you can manage the installation of the SDMA feature. This feature is managed through a one time license installation. This license is issued on a unit by unit basis. That means that a license issued will work only with the unit the license was issued for.

In order to get a license, please send the Tech Support Report and your company details to:

support@wavionnetworks.com

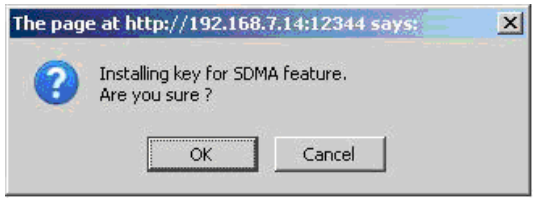
For help creating the Tech Support Report, please refer to Debug Interface section. Please send one Tech Support Report per each WBS-2400 where you want to enable the SDMA feature.

Figure 2.5 **Features Licensing Tab**

Installing the SDMA feature

Upon reception of the license key, type it in the "Key" field of the "License Featuring" tab. Click on the "Install" button. A pop-up window will appears.

Figure 2.6 **Features Licensing Tab- SDMA Installation**



After acceptance, the feature will be installed but not active

Figure 2.7 **SDMA after Installation**

For SDMA activation, the system configuration must be saved and the unit must be rebooted.

Figure 2.8 **SDMA Installed and Active**

Note: Although the feature is installed, you can enable and disable it through the Wireless tab in Network-> Wireless menu.

Viewing the System Hardware Components

The System Hardware page lists the components of the system.

Figure 2.9 **System Hardware Page-WBS-2400**

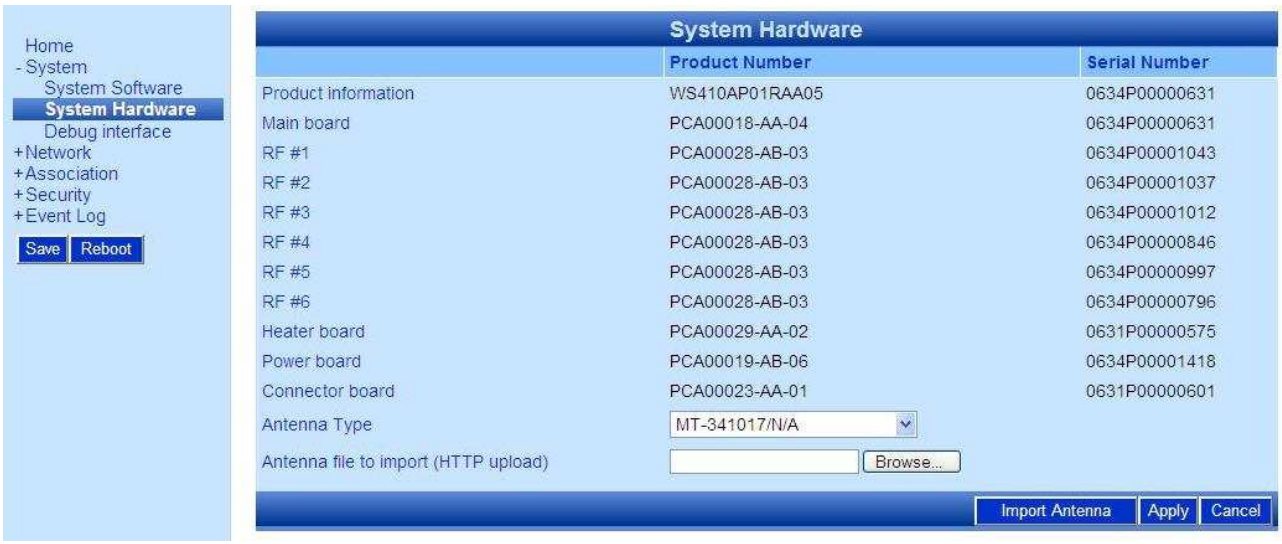
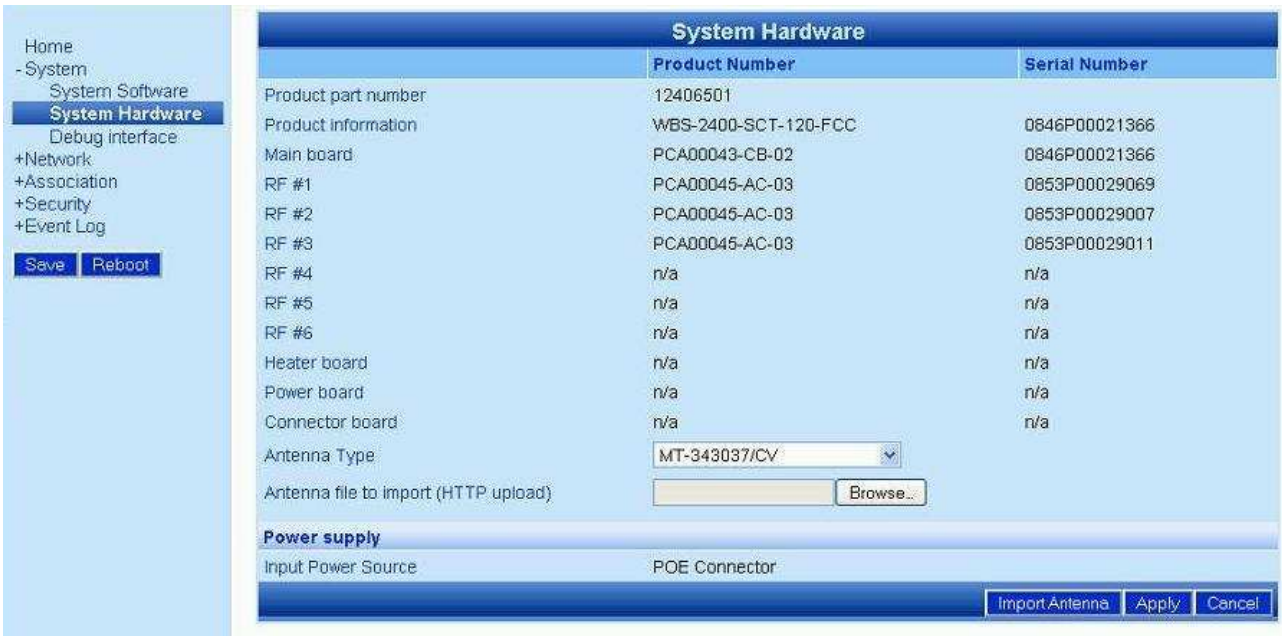


Figure 2.10 **System Hardware Page-WBS-2400-SCT**



The following information is displayed on the System Hardware page for each component.

Table- 2.3 System Hardware page

Field	Description
Product Number	An internal ID which identifies the components of the system. There are no field replaceable units. This information may be used to identify the hardware components.
Serial Number	An internal ID which identifies the date of manufacture, production lot, and individual component. There are no field replaceable units. This information along with the product number may be used to identify the specific hardware component.
Antenna Type	The Antenna Type indicates the default antenna type that is installed in the unit. Although WBS-2400 antennas can be detached from the unit, they should be considered as integral part of the WBS-2400. The beamforming capability takes into account the specific attributes of the antennas. Replacement of antenna should never be done without official instructions from Wavion Technical Support person

Debug Interface

The Debug interface page allows Wavion's technical support team to get critical information about the status of your system Software and Hardware.

In case of faulty system behavior you may be asked by a Wavion technical support member to save the file listed in the Debug Interface page, or to enter a code that will generate special file for engineer's inspection.

Figure 2.11 **Debug Interface Page**

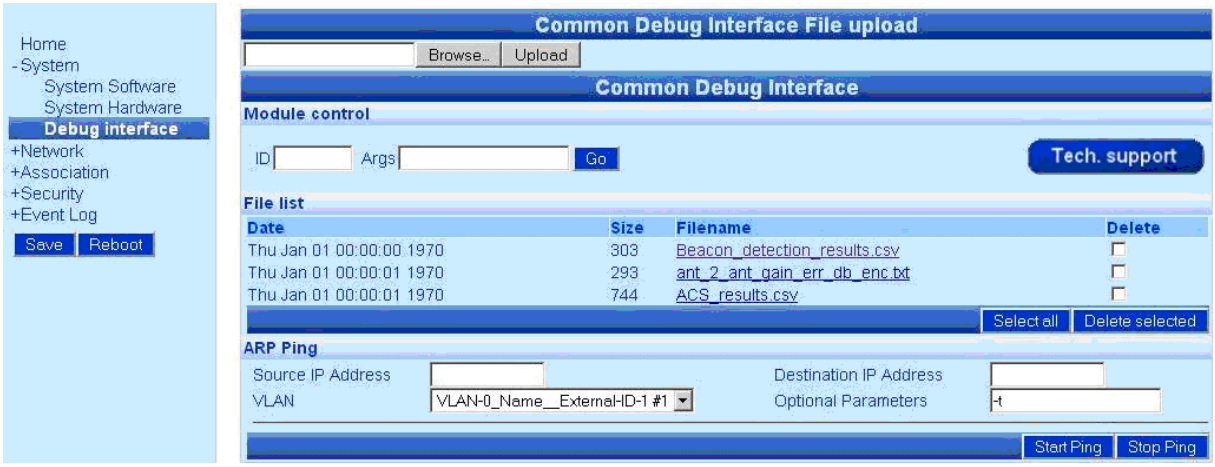


Table- 2.4 Debug Interface page

Field	Description
Common Debug Interface File Upload	In rare cases you will be asked by Wavion technical person to upload a file into the system to help critical issue debugging.
Module Control	
ID/Args	These codes will be given by Wavion Technical support person to load to the system in order to get help with critical debugging.
Tech. support button	This button creates a Tech Support Report file with all the unit's configuration and other information needed by Wavion Tech Support Department in order to debug a problem.
File List	This list contains debugging files that helps Wavion technical support to define HW or SW problems in field. Please send this file to Wavion technical support for analyzing your system conditions.
ARP PING	This tool test the connectivity of the WBS by sending a L2 PING towards a device in a specific broadcast domain
Source IP address	IP address to be set as SENDER in the ARP message. This IP should be an available address and must lay on the same subnet as the destination IP address
Destination IP address	IP address to be set as TARGET in the ARP message. This IP address must lay on the same subnet as the source IP address

VLAN	Select the VLAN (broadcast domain) where the IP addresses should be valid
Optional Parameters	Leave it blank for a repetition of 5 PING. Select "–t" for a non-stop PING stream.

Chapter 3

Managing Network Interfaces

You can view the status of the network interfaces. There is a summary page and a separate page where each interface can be managed.

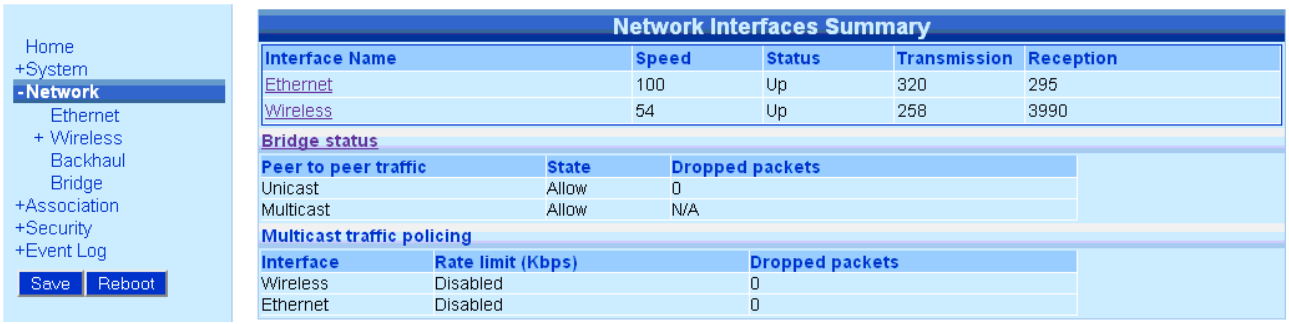
Viewing the Network Interfaces Summary

To view the Network Interfaces Summary page

- Click Network Interfaces in the menu.

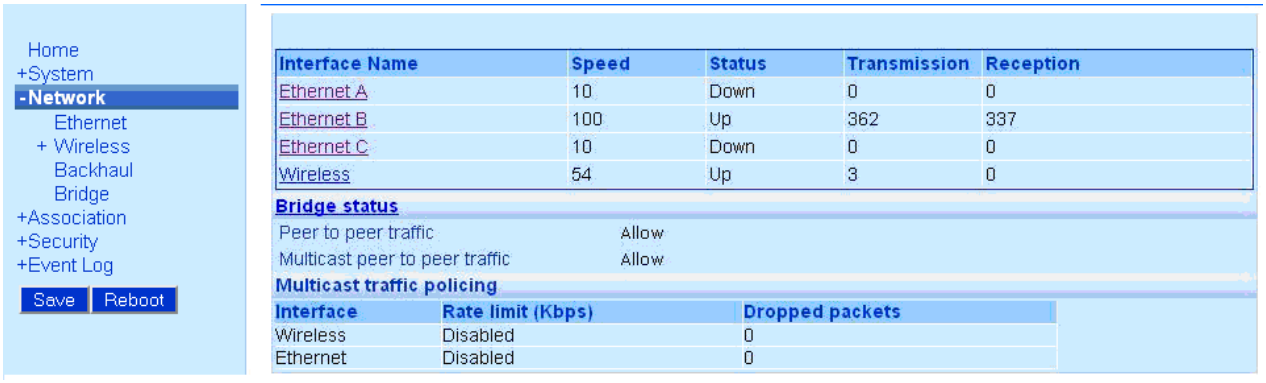
Depending on whether the base station has an embedded Ethernet Switch or not the view of the Network Interface Summary page will be different

Figure 3.1 **Network Interfaces Summary for a system without embedded switch**



You can click Ethernet or Wireless on either the page or the menu bar to view the Ethernet or Wireless Interface pages.

Figure 3.2 **Network Interfaces Summary for units with embedded Ethernet Switch**



You can click ETH A, ETH B, ETH C or Wireless in the page to view the Ethernet or Wireless Interface pages. Alternatively, you can click Ethernet or Wireless in the menu bar to view corresponding interface pages

The following fields appear on the Network Interfaces Summary page:

Table- 3.1 Network Interfaces Summary page

Field	Description
Interface Name	List of network interfaces
Speed	Maximum transmission rate on the interface in Mbps
Status	Indicates whether interface is up or down
Transmission (bytes)	Current total transmission in bytes through the interface
Reception (bytes)	Current total reception in bytes through the interface
Bridge Configuration	Shows whether the data or multicast peer-to-peer traffic is allowed or blocked
Multicast Traffic Policing	Shows the maximal traffic allowed for Multicast/Broadcast data in each interface in Kbps and the dropped packets as en effect of that.
Options	
Apply	Click to have your changes take effect temporarily
Save	Click to have your changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

Managing the Ethernet Interface

The Ethernet page displays status and configuration parameters, and statistics information for the Ethernet interface.

To view the Ethernet interface parameters and statistics.

- Click Ethernet either from the Network Interfaces Summary or as a sub-item of the Network Interfaces menu item.

Figure 3.3 **Ethernet Page for systems without embedded switch**

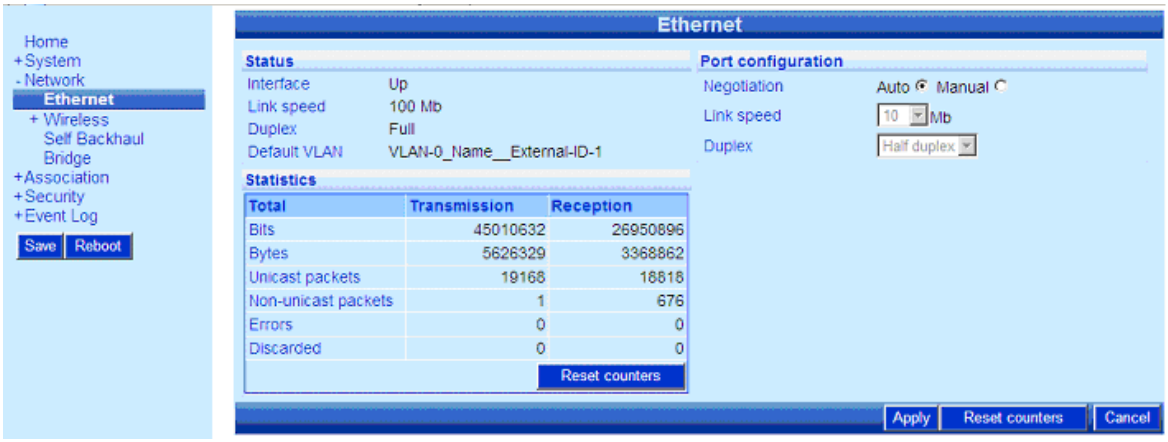


Table- 3.2 Ethernet page (no embedded switch)

Field	Description
Status and Configuration	
Interface	Up/Down
Link Speed	10/100
Duplex	Indicates whether transmission through the interface is full duplex or half duplex
Default VLAN	Default VLAN of this interface, when working in VLAN mode
Options	
Negotiation	Auto/Manual
Link Speed	10/100
Duplex	Full/Half

Figure 3.4 **Ethernet Page for systems with embedded switch**

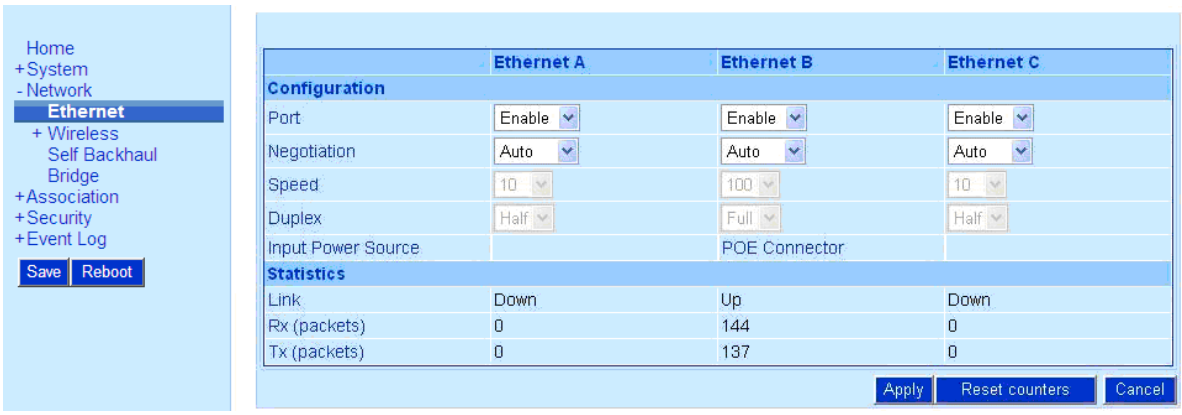


Table- 3.3 Ethernet page (embedded switch)

Field	Description
Configuration	**for each Ethernet port: ETH A, ETH B, ETH C**
Port	Enable/Disable of the port
Negotiation	Auto/Manual
Speed	Link Speed [Mbps]-Options: 10/100
Duplex	Indicates whether transmission through the interface is full duplex or half duplex-Options: Full/Half
POE	Option for POE output from Ethernet port B (ETH B). *This parameter will appear only if the unit is powered from AC* Options: OFF/ON (POE output)
Input Power Source	POE Connector – the units is powered from POE injector AC Power Connector – the unit is AC powered
Statistics	
Link	Status of the link (Up or Down)
Rx (packets)	Total number of received packets from Ethernet
Tx (packets)	Total number of transmitted packets towards Ethernet

Managing the Wireless Interface

The Wireless menu displays three pages and one sub-menu:

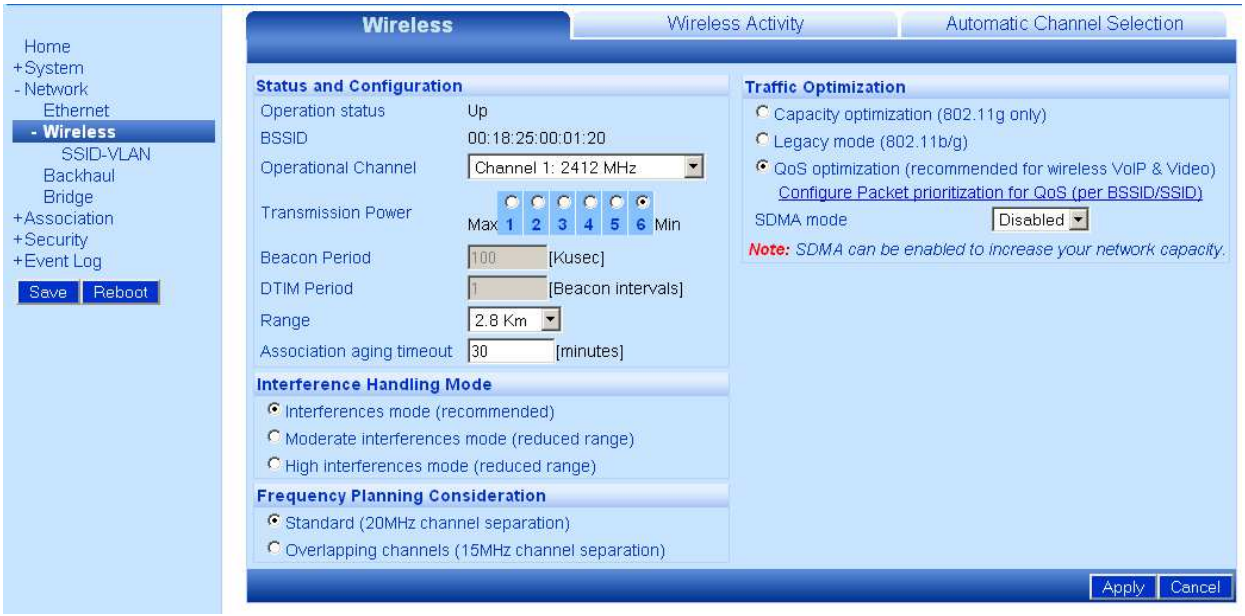
- Wireless pages:
    - Wireless (configurable): Status and Configuration details, Interference Handling Mode, Frequency Planning Consideration, Traffic Optimization.
    - Wireless Activity: Statistics, RF Channel Parameters, SDMA parameters.
    - ACS (Automatic Channel Selection)
- SSID-VLAN submenu: For details on this sub-menu please refer to Managing SSID

To view the Wireless interface parameters and statistics.

- Click Wireless either from Home Summary Status or Wireless as a sub-item of the Network Interfaces menu item.

The Wireless page displays.

Figure 3.5 **Wireless Page**



The following fields appear on the Wireless page:

Table- 3.4 Wireless page

Field	Description
Status and Configuration	

Table- 3.4 Wireless page

Field	Description
Operational Status	Up/Down
BSSID	Identifier MAC address of the BST
Operational Channel	The wireless channel used by the unit. See Setting the Operational Channel
Transmission Power	Default Max=1 for maximum Tx Power and Min=6 for lowest Tx Power. It's a 3dB steps. Should be set to maximum for most applications.
Beacon Period (Kusec)	Amount of time between beacons in kilomicroseconds. One Kusec equals 1,024 microseconds, which is close to 1 millisecond. Default is 100ms. Not configurable.
DTIM Period (Beacon intervals)	Determines how often the beacon contains a Delivery Traffic Indication Message (DTIM). This message "wakes up" any CPE in power-save mode. Not configurable
Range	Sets the maximal distance for an associated CPE based on radio propagation delay. Values: 2.8,5,10 and 15Km
Association aging timeout	The amount of time after which an inactive CPE (a CPE that neither received nor transmitted data) is disassociated from the BST. The minimum value is 5 minutes, maximum is 30 minutes. The default value is 15 minutes.
Interference Handling Mode	Selects the way the system handles the interferences. It can be set to any of the following four modes: • Interferences Mode • Moderate Interferences Mode • High Interferences Mode **The recommended mode is Interferences mode**
Frequency Planning Consideration	• **Standard**: System works in standard (20MHz) channel separation • **Overlapping**: System is optimized for 15MHz channel separation *Note: Enabling the Overlapping mode will decrease the Tx power by about 3dB.*
Traffic Optimization	

Table- 3.4 Wireless page

Field	Description
	• **Capacity optimization (802.11g only)**: CPE wishing to associate to the BST must support 802.11g protocol. • **Legacy mode (802.11b/g):** This mode allows 802.11b CPE to associate. • **QoS Optimization**: System is optimized for VoIP deployments. CPE wishing to associate to the BST must support 802.11g protocol. The CPE should support working with multicast/broadcast data at 12Mbps.
	Configure Packet priorization for QoS (per BSSID/SSID) is a shortcut to the SSID-VLAN/BSSID list where the QoS configuration is performed on BSSID/SSID basis.
SDMA mode	Enables or disables the use of SDMA. The feature must be installed before usage. Please refer to Installing the SDMA Feature
Options	
Apply	Click to have your changes take effect temporarily
Save (from the menu bar)	Click to have your changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

On this page you can configure the wireless interface. There are several recommendations for this page.

Setting the Operational Channel

The wireless activity in a channel is an important factor in network performance. Channel activity is indicated by the Idle Time; low values indicate high activity in the channel.

High numbers in "Other WiFi activity" means interference from a co-located channel system. "Interferences" activity represents adjacent channel systems.

Note: Measurements made to select a channel are best performed when there is limited or no traffic to WBS-2400.

To set the Operational Channel

In the Status and Configuration area, from the dropdown list in the Operational Channel field, select the channel on which the system runs. Default is Channel 6: 2437 MHz.

Setting the Transmission Power

Be sure the Transmission Power is set to the maximum; the radio button in this field should be set on the setting closest to the word Max.

Selecting the Interference Handling Mode

The default Interference Handing Mode is ***Interferences Mode***. This mode adaptively changes the system sensitivity according to the interference conditions in the environment. In some cases, using the other modes may result in better performance than ***Interferences Mode*** due to limitations with tracking the exact interference. For the identification of the different cases the "Channel Parameters" section in the "Wireless Activity" Page must be consulted.

As a rule of thumb, when the sum of "Other WiFi activity" and "Interferences" activity percentages is more than half the percentage of "Idle Time", changing the interference handling mode to the next mode may help to improve the overall performance of the system.

- ◊ From "Interferences Mode" change to "Moderate Interferences Mode".
- ◊ From "Moderate Interferences Mode change" to "High Interferences Mode".

After changes please allow 10 minutes for the interference mitigation algorithm to reach steady state. Check the performance of the system before you change to the next mode.

Frequency Planning Consideration

When high-density deployments are needed, one of the main issues is the frequency planning and re-use. IEEE 802.11 define 20MHz channels that overlap. In 802.11b/g there are only 3 channels that do not overlap. These channels are channel 1 (2412MHz), channel 6 (2437MHz) and channel 11 (2462MHz).

The Wavion base station is capable of working in 15MHz channel separation, while having minimum overlapping effect on neighboring (15MHz) channels. At 2.4GHz band (802.11b/g), that means that there can be 4 non-overlapped channels: Channel 1 (2412MHz), channel 4 (2427MHz), channel 8 (2447MHz), and channel 11 (2.462MHz). Despite this, any standard 802.11 CPE will be able to work with the WBS without throughput degradation.

The WBS-2400 also reduces the Tx power automatically when in Overlapping mode to allow better signal quality in sites where several base-stations are co-located. However, a slightly larger BST separation of 2 meters between units must be kept.

Selecting the Traffic Optimization

The WBS-2400 and WBS-2400-SCT is set by default to "Capacity optimization". This mode supports only CPE that can work in 802.11g protocol. This mode is optimized to achieve a higher capacity when compared to 802.11b systems.

When older, 802.11b CPE are present in the covered area, is possible to allow their association to the base station. In order to do that, please set the base station to work in "Legacy mode".

Legacy mode allows the connection of 802.11b and 802.11g CPE.

Wavion base station supports QoS applications, specifically, VoIP and Video. When "QOS optimization" mode is enabled, the system allows only 802.11g CPE to connect. QoS Optimization adds another level of data handling. Data is prioritized by its QoS settings, several other parameters in the system are set automatically to give VoIP the best conditions to work.

In order to better support real-time applications, the minimum rate used by the system is 12Mbps. Please check the CPE you are using supports multicast/broadcast data sent at this rate.

This mode has best results using an outdoor CPE, like Ubiquiti's NS2, when connected in good SNR (greater than 15dB).

QoS support is done by prioritization. The packets prioritization over WiFi is based on 4 Access Categories defined by the WMM standard:

- ◊ Voice traffic
- ◊ Video traffic
- ◊ Best effort traffic
- ◊ Background traffic

A packet arriving at the Ethernet interface of the base station will be classified to one of the Access categories. The classification can be done using ToS, DSCP or VLAN Priority. For classification configuration please refer to paragraph QoS Packets Priority.

Note: For two way QoS priorization (for example in VoIP application), a WMM supporting CPE must be used for uplink QoS classification. Failing to do so will cause a bad functionality of priorization in the system.

A maximum of 20 concurrent calls with high quality (MOS > 3.8) and high TCP traffic, or 15 video concurrent streams (of 1Mbps each) are achieved when "QoS Optimization" is selected on the WBS management interface and an NS2 is used as CPE.

SDMA mode

Wavion's SDMA technology sends two concurrent data streams from the base station to two different users. This doubles the downlink capacity of each base station. The feature must be installed prior to enabling it. Please refer to Installing the SDMA Feature.

SDMA will work with CPE that are connected to the WBS with an SNR higher than 15dB, and when the CPE Downlink modulation is above 5.5Mbps in 802.11b mode or 54Mbps when working in 802.11g protocol.
When two WBS are connected through Self-backhaul, the SDMA feature will work only towards the access part and not on the Self-Backhaul link itself.
The feature has limitations which justifies the ability to enable and disable the feature according to the application:

- ◊ Long Range links: When the Range parameter in the Status and Configuration section (in the Wireless tab) is set to a value of 10Km or 15Km, the SDMA feature is disabled automatically.
- ◊ VoIP: SDMA doubles the traffic in the downlink direction. When VoIP is the main application implemented in the system, symmetrical, two-way traffic is needed. Because of the different mechanisms this feature uses, it is recommended to disable the feature.

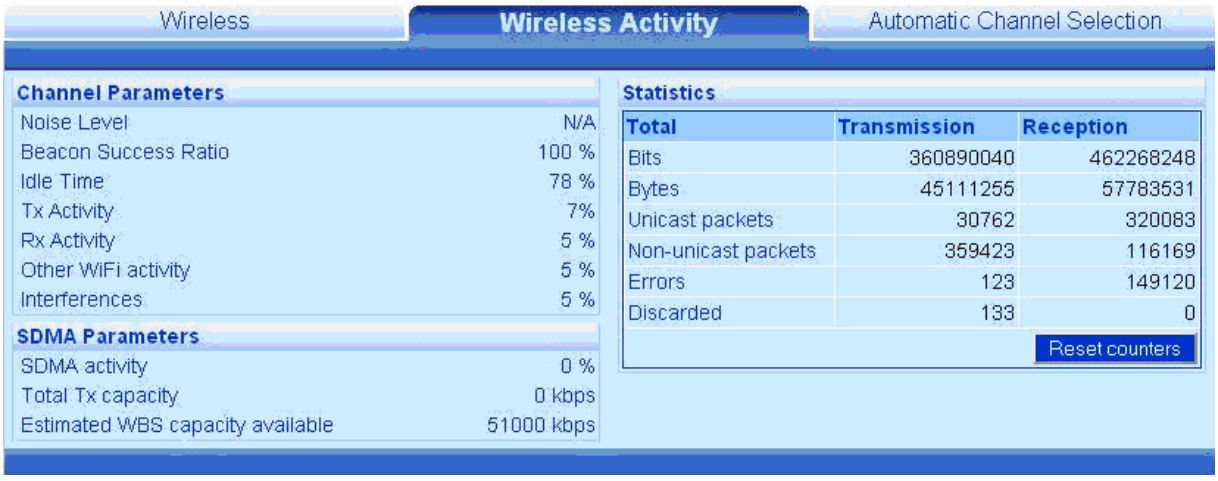
Saving Changes

Click Apply.

Click Save.

Wireless Activity

Figure 3.6 **Wireless Activity Page**



The following fields appear on the Wireless Activity page:

Table- 3.5 Wireless Activity page

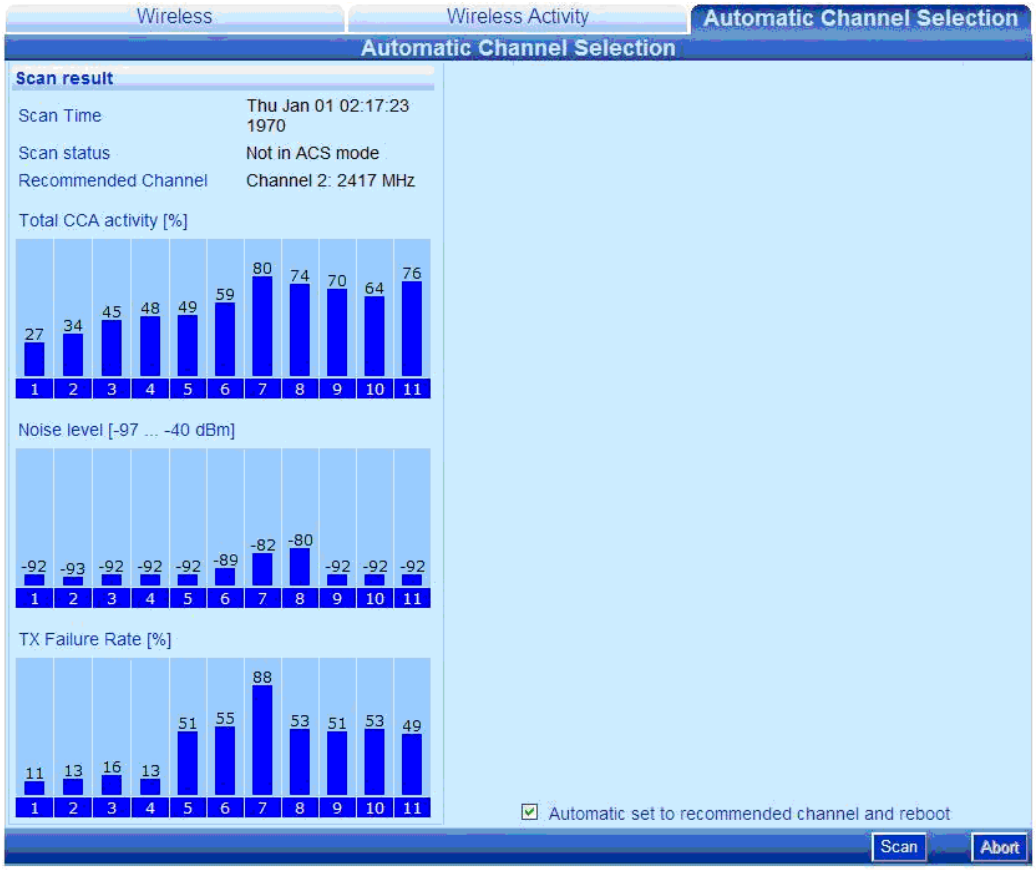
Field	Description
Channel Parameters	
Noise Level	The level of the system noise power in dBm. Nominal noise level without interference is -97 dBm. Higher values indicate higher noise levels due to interference presence. *Note: Noise level will show N/A after reboot. It will update after 4~6 minutes up time when the Calibration cycle 0 is done.*
Beacon Success Ratio	The ratio, in percentage, between the number of beacons that the BST transmitted and the beacons that the BST should have transmitted. A low percentage indicates lost beacons probably due to high activity in the channel (CCA is high) that does not enable transmission.
Idle Time	The relative amount of time (in percentage from the 100% of the total time) that the system is neither transmitting nor receiving. Maximum performance from the unit is achieved when this number is low. Together with the "Interferences" and "Others" counters helps to detect high-interfered links. It is affected from the environment activity of other wireless devices and from its own activity.
Tx Activity	The relative amount of time (in percentage from the 100% of the total time) in which Channel was busy transmitting data.
Rx Activity	The relative amount of time (in Percentage from the 100% of the total time) in which Channel was busy receiving valid data that was successfully decoded and was aimed to the WBS.
Other WiFi activity	The relative amount of time (in Percentage from the 100% of the total time) in which Channel was busy receiving valid data not aimed at the specific WBS (data from other networks).
Interferences	The sum of Invalid CS Packets (reception that failed to be modulated correctly) and Invalid ED Packets (energy was detected but no valid carrier was found) activities (in Percentage from the 100% of the total time).
SDMA Parameters	
SDMA activity	The percentage of packets that were transmitted using SDMA from the total amount of packets transmitted.

Table- 3.5 Wireless Activity page

Field	Description
Total Tx capacity	The calculated average throughput that was achieved (in Kbps) since the last screen refresh.
Estimated WBS capacity available	The estimated available throughput based on parameters of last transmissions, SDMA activity and channel parameters. When the throughput in last transmission and SDMA activity is near zero , the field shows the maximum available throughput : ◊ When SDMA is disabled: 29593 kbps. ◊ When SDMA is enabled: 51200 kbps
Statistics	Total amount in Transmission and Reception of the following parameters
Bits	The number of bits transmitted/received.
Bytes	The number of bytes transmitted/received.
Unicast Packets	The number of Unicast Packets transmitted/received.
Non-Unicast Packets	The number of Non-Unicast Packets transmitted/received.
Errors	The number of errors that occurred during transmission/reception.
Discarded	The number of discards that occurred during transmission/reception.
Reset Counters Button	Resets the counters. In order to see new numbers refresh the page.
Options	
Apply	Click to have your changes take effect temporarily
Save (from the menu bar)	Click to have your changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

Automatic Channel Selection

Figure 3.7 **Automatic Channel Selection Page in Standalone Mode**


Wireless
Wireless Activity
Automatic Channel Selection
Automatic Channel Selection
Scan result
Scan Time
Thu Jan 01 02:17:23 1970
Scan status
Not in ACS mode
Recommended Channel
Channel 2: 2417 MHz
Total CCA activity [%]
27 34 45 48 49 59 80 74 70 64 76
1 2 3 4 5 6 7 8 9 10 11
Noise level [-97 ... -40 dBm]
-92 -93 -92 -92 -92 -89 -82 -80 -92 -92 -92
1 2 3 4 5 6 7 8 9 10 11
TX Failure Rate [%]
11 13 16 13 51 55 88 53 51 53 49
1 2 3 4 5 6 7 8 9 10 11
Automatic set to recommended channel and reboot
Scan
Abort

The Automatic Channel Selection (ACS) is a tool for automatic scanning the frequency channels, and selecting the best channel based on the activity and the interference level of each channel. It is useful for both standalone deployment and in assisting tool for multi-BST deployment.

The ACS scans the selected channels list, displays the scanned results to the user, and recommends the best channel for operation.

The scanning activation and results retrieval are available by SNMP to enable centralized operation of the channel scanning and selection.

How to initiate Scan in Standalone Mode:

Pressing scan button in the ACS page will initiate the scan process. During the process, the system will reboot to Scan Mode, perform the scan and afterwards will automatically reboot back to Operational Mode.

Note: During scan mode the system will not be operational, i.e. clients will not be able to associate, although beacons will continue to be transmitted.

How to return to Operational Mode:

The system will automatically return to operational mode with the recommended channel selected by the ACS algorithm unless the "*Automatic set to recommended channel and reboot*" checkbox is not checked. In this case the system will return to the previous selected channel after the scanning.

During any time in which the system is not in operational mode, selecting a channel from "Operational channel" list-box and pressing reboot will return the system to operational mode with the selected channel. The list-box appears during the scan.

The following fields appear in the Automatic Channel Selection page:

Table- 3.6 Automatic Channel Selection page

Field	Description
Automatic set to recommended channel and reboot	• **Enabled** - After completion of the frequency scan, the unit will choose the best fit frequency and automatically reboot the system. • **Disabled** - The user has to choose a channel from Channel Selection and reboot to return unit in Operation.
Scan results	

Table- 3.6 Automatic Channel Selection page

Field	Description
Scan Status	Status of the system mode. • Not in ACS mode - is shown during operational mode • Scanning - is shown during scan
Recommended channel	The best channel that was chosen based on scan results. It selects the best channel from channels selected in the "available channel" list. The recommended channel is selected based both on noise level and channel activity.
Total CCA activity	Total activity in the selected channel in percentage
Noise level	Level of the noise as measured by the BST
TX failure rate	Percentage of the times that the system failed to transmit due to the channel's activity

Backhaul

The WBS-2400 and WBS-2400-SCT have two important features to help the operator to deploy the systems more efficiently.

Those features are:

- ◊ Backhaul CPE
- ◊ Self-Backhaul (SBH)

Figure 3.8 **Connected Backhauls page**

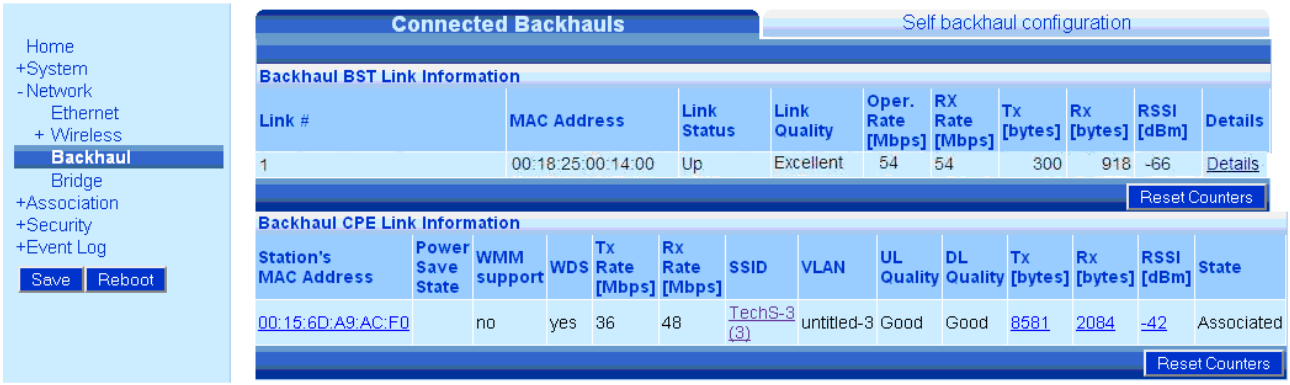


Table- 3.7 Connected Backhauls

Field	Description
Backhaul BST Link Information	
Link #	Index of the Self-backhaul link
MAC Address	MAC Address of the peer BST.
Link Status	Status of the SBH link: ◊ Up: Link is working ◊ Unidirectional.: Link is not working, configuration problems ◊ Down: Link is not working
Link Quality	Quality of the SBH link: ◊ Excellent ◊ Good ◊ Fair ◊ Poor

Field	Description
Operational Rate	The rate of the data transmitted to Peer BST on the SBH link.
Rx Rate	The rate of the data received from Peer BST on the SBH link.
Tx Bytes	Amount of bytes transmitted
Rx Bytes	Amount of bytes received
RSSI	The symmetrical Rx Signal Level of the link
Details	Details of the Connected BST
Backhaul CPE Link information	
Station's MAC Address	MAC (Media Access Control) address of the associated station
Power Save State	Value of Doze in this field indicates that the associated station is in power save mode
WMM support	Value of 'yes' in this field indicates that the associated station supports the WMM protocol. . For more information about working with QoS please refer to "QoS Packet Priority"
WDS	For this feature the CPE should support WDS. "Yes" will indicate WDS support The supported CPE are Ubiquity NS2/PS2 running version 3.2.2, and Ruckus running version 4.4.2.0.28.
Tx Rate [Mbps]	PHY Rate (modulation) at which the base station currently transmits to the associated station
Rx Rate [Mbps]	PHY Rate (modulation) at which the associated station currently transmits to the base station
SSID	SSID to which the associated station is associated (should be the 'backhaul SSID')
VLAN	VLAN name to which the station is bound. (should be the VLAN of the 'backhaul SSID')
UL Quality	Quality of the Up Link: Reported by WBS. ◊ Good ◊ Poor
DL Quality	Quality of the Down Link: Reported by CPE ◊ Good ◊ Poor
Tx[Bytes]	Number of bytes transmitted by BST to the station
Rx[Bytes]	Number of bytes received by the BST from the station
RSSI[dBm]	The Received Signal Strength Indicator power received by the BST from the associated station.

Field	Description
State	State of which the station is connected

Backhaul CPE

The Backhaul CPE feature allows to create an SSID that together with the CPE associated to it creates a trunking interface. This interface is capable of tunneling tagged VLAN between the two ends (CPE and BST).

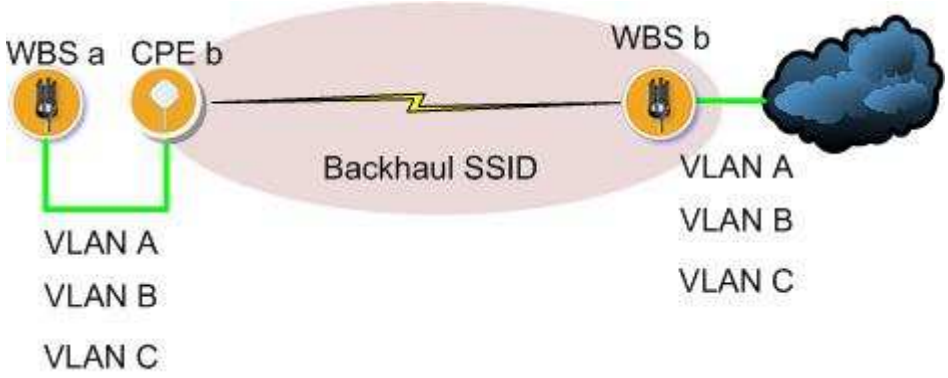
Only one SSID can be configured as backhaul SSID. The number of VLAN capable to be trunked is the number of available VLAN in the system (15 in SSID-VLAN mode, 5 in BSSID mode).

It is highly recommended to connect no more than 20 CPE to the backhaul SSID to avoid bandwidth stagnation.

This feature works only with specific CPE models, as it uses the WDS feature.

The supported CPE are Ubiquity NS2/PS2 running version 3.2.2 and up, and Ruckus running version 4.4.2.0.28.

Figure 3.9 **Backhaul CPE Configuration**



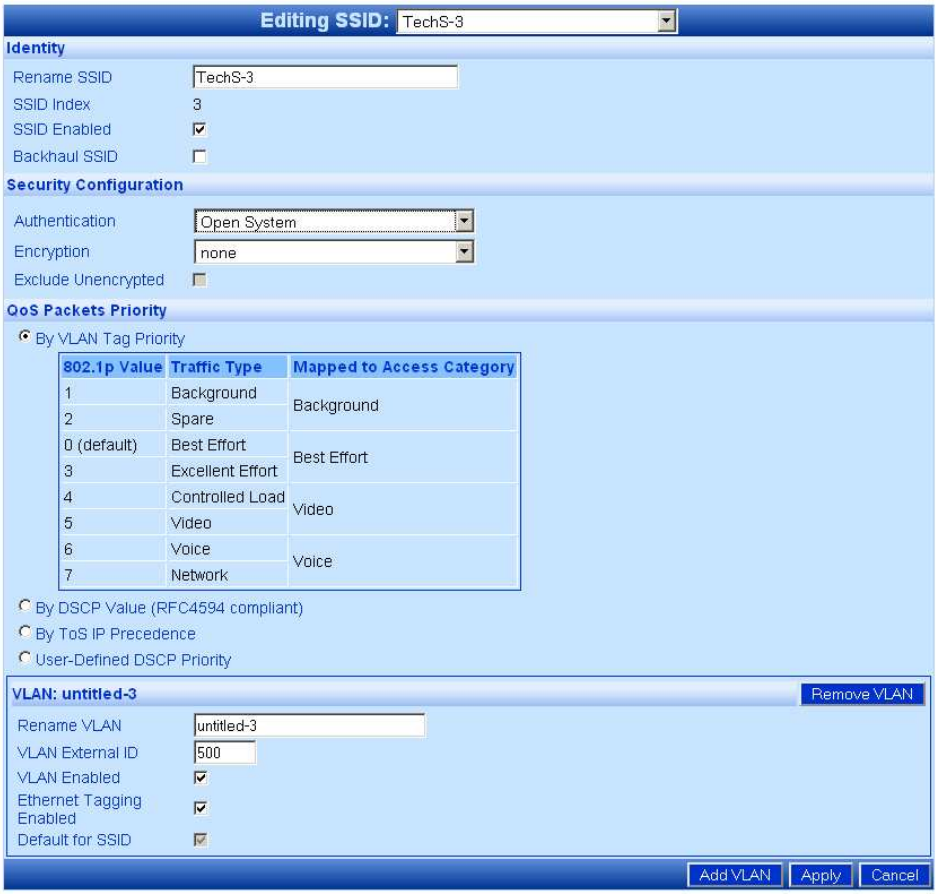
How to create a Backhaul SSID:

The backhaul SSID is created through the VLAN-SSID menu. Please refer to SSID-VLAN page for a detailed description of the SSID-VLAN mechanism.

The steps in order to set the SSID as backhaul are identical whether you are in SSID-VLAN mode or in BSSID mode.

These steps are shown below in SSID-VLAN mode. In BSSID mode, only some names are different.

1. Select an SSID

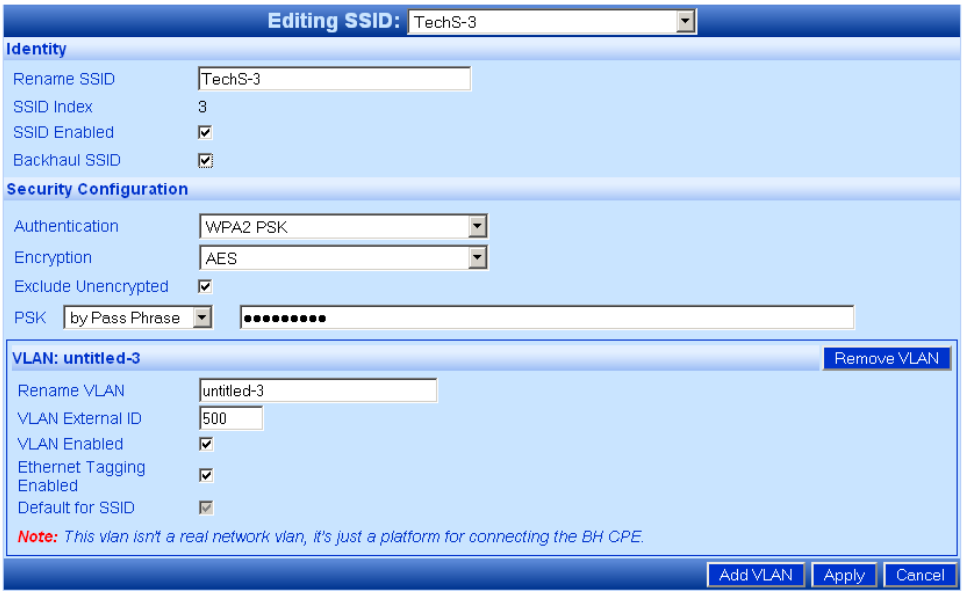


2. Set the SSID as Backhaul SSID by checking the "Backhaul SSID" checkbox.

Please pay attention that the Authentication settings will change automatically to WPA2 PSK and the Encryption to AES. Please choose a pass phrase for authentication.

QoS priority will be performed only according to 802.1p, so all the other QoS types (TOS, DSCP, Custom) are not shown.

The VLAN set in the SSID is not used at the network side. This VLAN helps to transport all the VLAN that exist on the backbone over the air.



3. Create the trunked VLAN on disabled SSID.

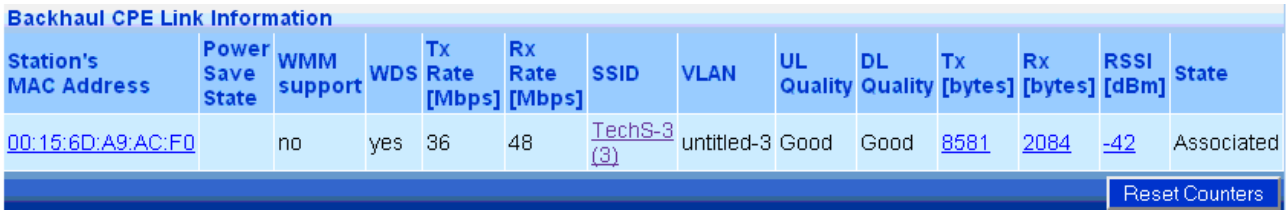
The VLAN appearing at the CPE side should be configured to appear at the WBS side. The way of doing that is by creating a new SSID with the required VLAN without enabling the SSID (the VLAN must be enabled). In this way, the VLAN will exist in the Ethernet interface of the WBS, but not in the air interface.

4. Connect CPE

Set the CPE to work as WDS station. All the VLAN frames at the CPE side will be encapsulated and transmitted to the WBS side. There they are de-capsulated and sent through the specific VLAN.

5. Check Status

The Backhaul CPE status can be checked through the “Connected Backhauls” page. Detailed information is displayed when the underlined values are selected. The details are identical as an associated CPE. Please refer to Viewing Associated Stations section for more information



Self-Backhaul (SBH)

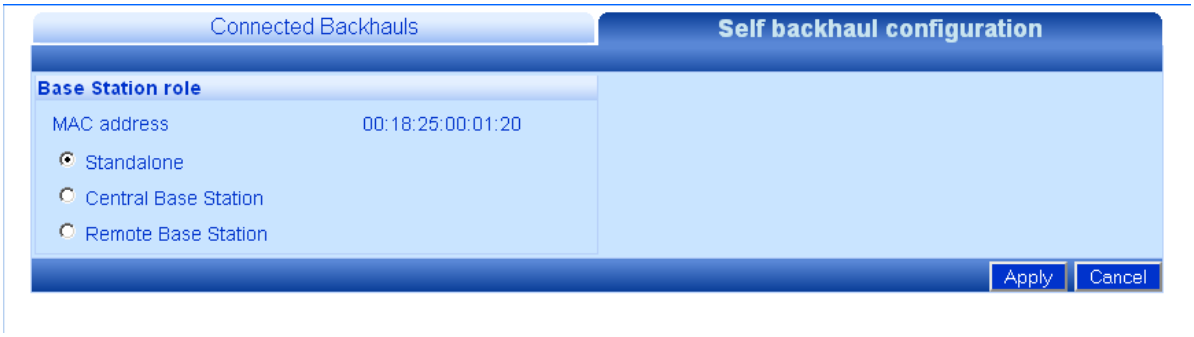
To reduce backhaul cost, Wavion's software feature allows operating a radio link between WBS-2400 units with up to 3 units per cluster: one central and up to 2 remote. This feature is based on in-band wireless backhaul connectivity with the link gain of 156dB for 6Mbps and 136dB for 54Mbps allowing to create links of up to 20Km distance in Line of Sight (LOS).

- Wavion's spatially adaptive beamforming applied on the backhaul links
  - Supports high capacity connections – up to 30Mbps per link
  - Beamforming works at both ends
  - Provides PtP performance with simple installation
    - No alignment needed

Self backhaul links utilizes the same 2.4GHz frequency in both the Central and Remote BST.

The Self Backhaul page displays

Figure 3.10 **Self Backhaul Configuration page**



The following fields appear in the Self Backhaul page.

Table- 3.8 Self Backhaul page

Field	Description
Self Backhaul	
Base Station Role	List of BST Role • **Standalone** - Not in Self Backhaul mode • **Central** - Is the HUB unit that interconnects between all the units. The central base station can be connected to up to 2 Remote base stations • **Remote** - The satellite BST that connects wirelessly to the central.

Beamforming Backhaul configuration

The Wavion Self backhaul:

Support for up to 2 Self Backhaul links between 2 Remote BST and central BST.

Deployment support tools for minimal field configuration of Self backhaul links through wireless media "scan" for peer BST in both remote BST and central BST.

A reliable bidirectional Self backhaul link validation mechanism and link quality indication exists.

Figure 3.11 **Self Backhaul Configuration**

Remote and Central Scan feature

To supports deployment of Remote BST. WBS-2400 have a tool that enables scanning for presence of BST in all the channels by the Remote (Remote-scan) and in the operative channel by the central BST (Central-scan). It gives the user the ability to select one of the BST as peer BST for Self Backhaul link and automatically adopt its configuration for establishment of Backhaul link.

Remote-Scan

Remote-Scan will use ACS mode and go over all channels. During Remote-Scan, only reception of beacons will be enabled (to avoid STA association).

In each channel, the list of candidates BST will be prepared and the SNR of each candidate will be measured (RSSI and noise level)

Remote-Scan will be activated only when the system is in operational mode

Remote-Scan will be activated only when the BST is configured as Remote

As in ACS in SBH, after the termination of the scan, the system will return to operational mode with the previously used channel.

Note: Only Wavion BST that configured to Central mode will be displayed in remote-scan. A list of all the BST found in the scan regardless of their vendor or mode appears in the Beacon detection results file in the Debug Interface.

Note: During remote-scan, the access to the remote unit is not possible. (unless there is a cable connection).

Scan in Central (Central-Scan)

Central-Scan will help user select Remote units per Central. A configuration update of the C-BST should be done by adding the new remote MAC address in order to enable Self Backhaul link with it. In order to ease this process and avoid MAC address typing error, the ability to adopt the MAC address from a list of BST that the C-BST detects in its channel is added.

Scanning for BST in the operational channel will be done when the BST is in operational mode.

The Central-scan will be triggered by the user by pressing a button in Self Backhaul page.

Every beacon from new BST that will be received during the scan period will be added to the list.

Cluster deployment in steps:

Step 1:

Configure the same passphrase to all Cluster BST- Please refer to the configuration steps (pages 41-44).

Step 2:

Install Central BST

Run ACS on Central BST to select the best channel

Set Channel

Step 3:

Install Remote-BST

Run Remote-Scan

Select the desired Central BST by click on entry in table.

Remote 1 will reboot in the desired channel with proper configuration

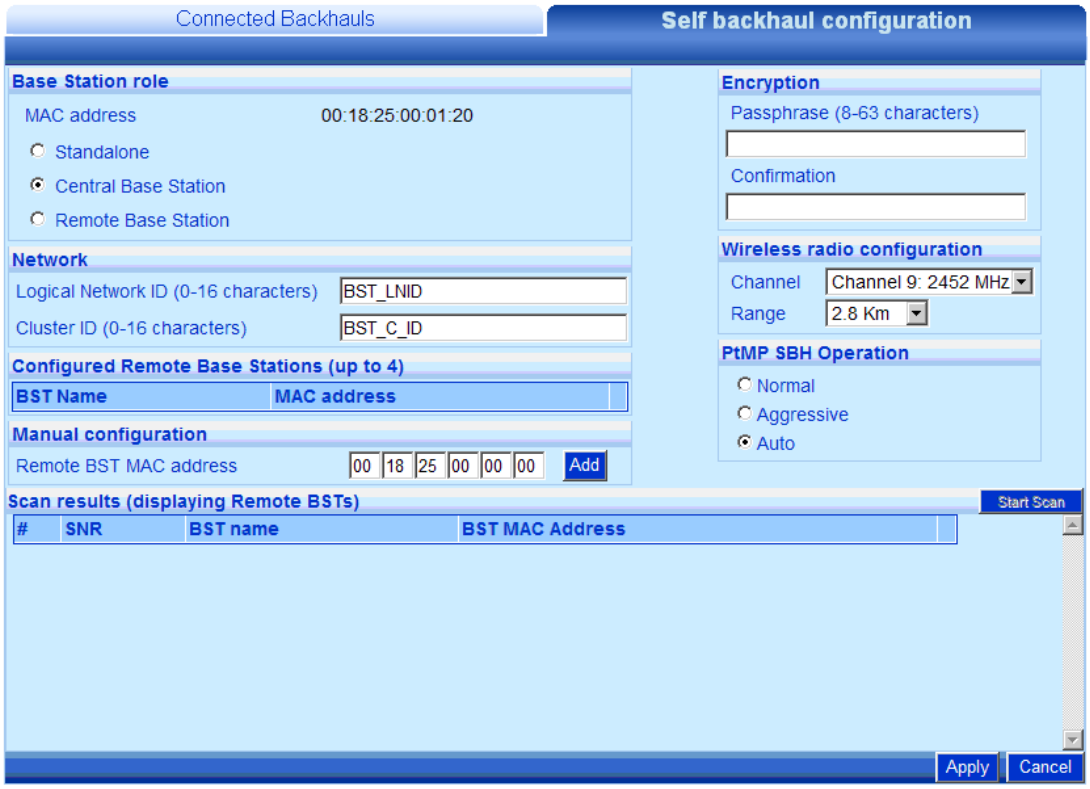
Step 4:

Execute Central-Scan and add Remote units to Central-BST

Central Configuration

1. Set the BST role to Central
2. The page will change automatically to Central BST configuration page.
3. Configure the Network parameters
4. Logical network ID
5. Cluster ID
6. Configure the Remote base stations
7. Enter passphrase.
8. Set the Operational channel
9. Set the Range between BST or between the farthest client and the BST.

Figure 3.12 **Self Backhaul Configuration page - Central**



1. Apply and save changes
2. Reboot the system.

Table- 3.9 Self Backhaul configuration - Central

Field	Description
Logical Network ID	A name that describe the network name (Suggestion: Enter the name of your company or ISP)
Cluster ID	A name that describes the cluster of BST. (Suggestion :Enter the name of the Central BST, or the BST that is connected to the GW of the network)
PtMP SBH Operation	The default mode is Auto Normal mode is to fine-tuning Point-to-Point Backhaul Aggressive mode is to fine-tuning Point-to-MultiPoint Backhaul

After you perform all of the above steps the BST should be connected wirelessly via the Wavion Self-Backhaul link.

Remote Configuration

1. Set the BST role to Remote

   The page will change automatically to Remote BST configuration page.

2. Configure the Network BST name (for identifying the BST in the central link stations list)

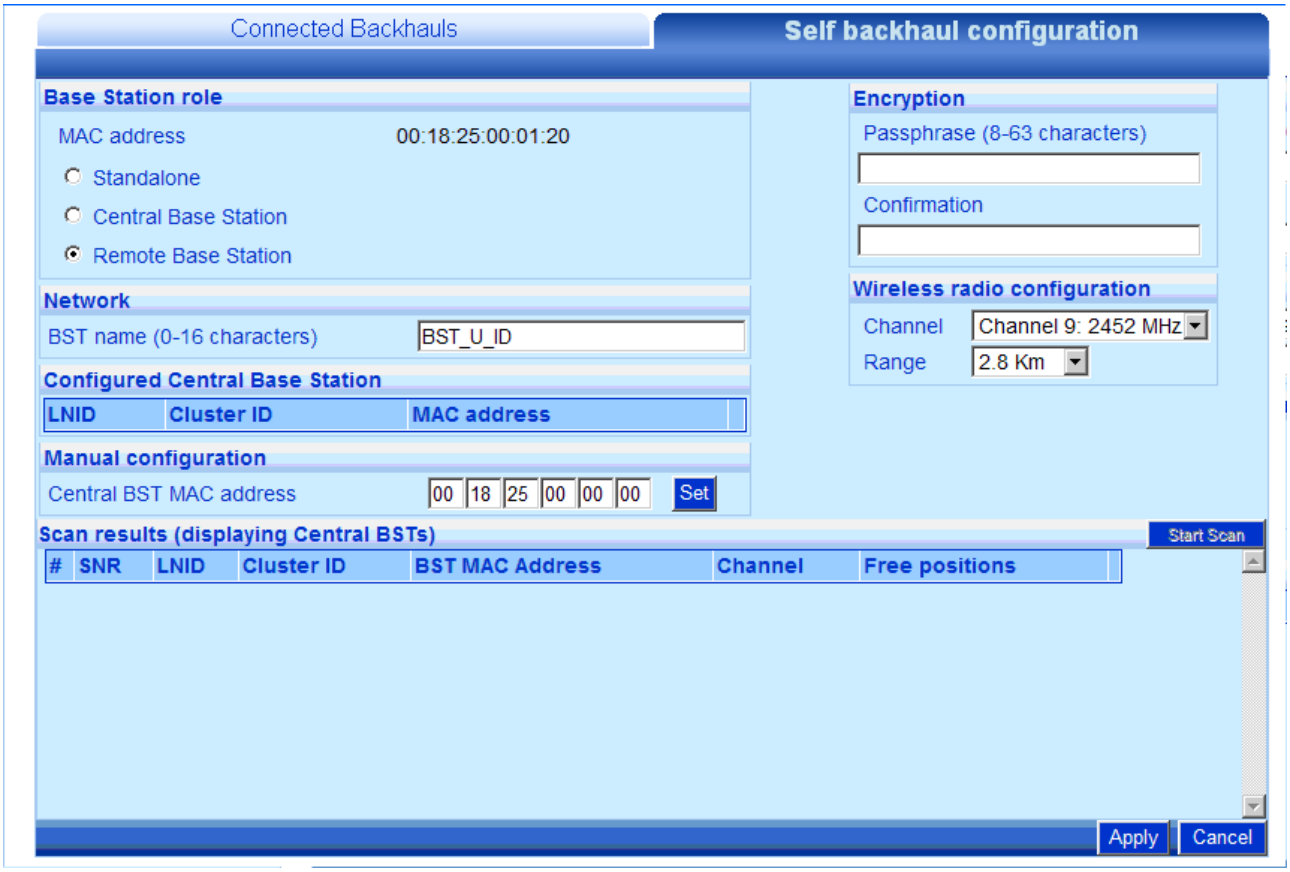
   2.1. Logical network ID

3. Configure the Central BST to connect with:

   3.1. Manually – insert the MAC address of central BST and push the Scan button

   3.2. Automatically - run the Remote-Scan

Figure 3.13 **Self Backhaul Configuration page - Remote**



To verify the connection qualities go to page:

Network Interfaces Self Backhaul Connected BST

The connection between the BST should be good or better.

Figure 3.14 **Backhaul BST Link Information page**

Note: To avoid Network loops, make sure there is no wired Ethernet connectivity to the remote BST that closes a loop with the Ethernet connectivity to the Central BST.

Note: All BST in the same cluster must be configured to the same channel.

Note: Range in all cluster should be the same

WARNING: Do not connect between two Central BST; this may lead to loose the connection between units.

How to initiate Channel Scan in Self Backhaul Mode:

Pressing scan button in the ACS page will initiate the scan process. During the process, the system will reboot to Scan Mode, perform the scan and afterwards will automatically reboot back to Operational Mode.

During scan mode the system will not be in operation, i.e. client will not be able to associate, although beacons will continue to be transmitted.

How to return to Operational Mode:

The system will automatically return to operational mode with the previous selected channel after the scanning.

During any time in which the system is not in operational mode, selecting channel from "Operational channel" list-box and pressing reboot will return the system to operational mode with the selected channel. Note that such operation is possible only on the Central BST (that still has Ethernet backhaul. However, if the operational channel of the central BST changes, make sure the same channel is selected on the remote BST (can be done if you wirelessly connect to the remote BST).

Bridge

Traffic Policing

The system has a mechanism that allows the user to set the maximum bandwidth used by broadcast and multicast messages. The policing of traffic also allows blocking any kind of peer-to-peer data transaction, unicast or multicast.

Figure 3.15 **Traffic Policing page**

Field	Description
Multicast Traffic Policing	
Wireless multicast rate limitation	• Disable: No limitation on the bandwidth allowed for multicast/broadcast messages in the wireless interface • Enable: The bandwidth allowed for multicast/broadcast messages in the wireless interface is limited to the rate stated in the field "Rate"
Ethernet multicast rate limitation	• Disable: No limitation on the bandwidth allowed for multicast/broadcast messages in the Ethernet interface • Enable: The bandwidth allowed for multicast/broadcast messages in the Ethernet interface is limited to the rate stated in the field "Rate"
Peer Traffic Policing	
Peer to peer communication	• Allow: peer-to-peer traffic is enable • Block excluding Management VLAN: peer-to-peer data traffic is blocked on all VLAN but the

Field	Description
	Management VLAN (active when more than one VLAN is configured). ***When only a single VLAN is configured Peer-to-Peer traffic is allowed.***
Multicast peer to peer communication	• Allow: multicast/broadcast peer-to-peer traffic is enable • Block: multicast/broadcast peer-to-peer traffic is blocked. Unicast peer-to-peer traffic is permitted.
Allow DHCP server on wireless interface	DHCP server (default gateway) in the wireless interface (not SBH) is valid. By default, this is not allowed.
Default gateway configuration	*Active only when peer-to-peer traffic is blocked*
Backhaul interface detection	Detection of DHCP server (default gateway) • Auto: Detection is done automatically (by looking for the DHCP Server / Default GW).. • Manual: Must specify manually on which interface resides the default gateway, and for non-multicast traffic, if it performs proxy ARP and its MAC address.

Multicast Traffic Policing

WBS has the ability to limit the rate of multicast (including broadcast) packets that are forwarded between interfaces. This feature is applicable to all multicast and broadcast packets.

WBS multicast policing is done on the ingress interface. Since it affects packets forwarded to the egress interface, the GUI configuration is indicated for the egress interface.

Specifically, if the network operator wishes to limit the amount of multicast packets that are flooded from the wireless access network into the Ethernet backhaul network, the policing should be marked on the Ethernet field, on all WBS in the cluster.

If the operator wished to limit the amount of multicast packets that are flooded from the Ethernet backhaul to the wireless, the configuration should be done on the Wireless field. In both cases the limit is determined by Kbps (kilobits per second).

WARNING: if the multicast limit is very low, i.e. most of broadcast and multicast packets are dropped, including ARP and DHCP. This may result in difficulties to establish any type of connection.

Figure 3.16 **Limiting the multicast rate**

Peer traffic policing

When peer-2-peer communication is blocked, all wireless clients are expected to communicate only with the Default GW. There may be cases in which the network operator wishes to allow peer-2-peer communication that goes through a specific router in the backhaul network, for monitoring and accounting. This option is possible by applying the Proxy ARP feature.

When peer-2-peer communication is blocked, WBS software sends wireless traffic only to the backhaul interface; including ARP and Gratuitous ARP packets. In layer-2 networks Gratuitous ARP serve as enablers for detecting duplicate IP addresses in the network. Since WBS doesn't send the Gratuitous ARP back to the wireless network, the network devices will not be able to detect Duplicate IP.

Figure 3.17 **Blocking peer-to-peer traffic**

LLC Encapsulation

All frames transmitted through the 802.11 interface must have an LLC header. For frames received at the WBS side of the link without an LLC header (mainly frames with EtherTypes

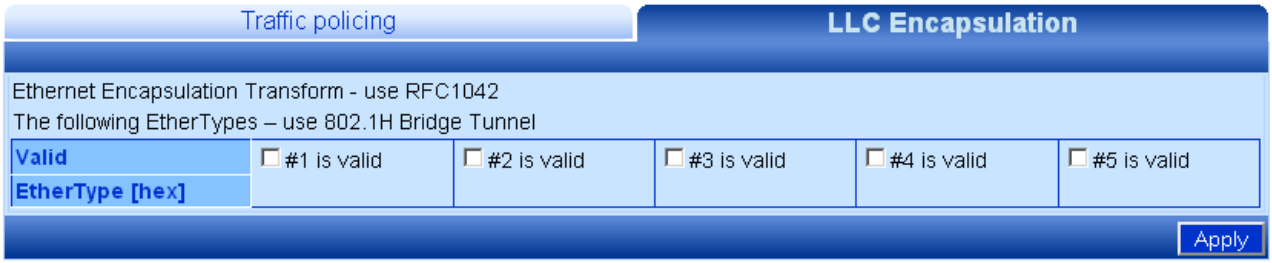
>1563) a substitute header should be added. This substitute header is set using an LLC header described in RFC 1042 (default option). This option can be overridden by using the header used in 802.1H protocol. The list of EtherTypes which are going to use the 802.1H header should be set in the LLC Encapsulation page.

This override option should be used when the WBS is used in non-802.3 Ethernet networks (FDDI, Token Ring, etc.)

The list of EtherTypes is used also to recover the frames in the uplink, as they are received with an LLC header from the 802.11 link.

LLC encapsulation	For each EtherType that is valid in this table, the 802.1H bridge tunnel encapsulation format is used. Otherwise, RFC1042 applies.

Figure 3.18 **LLC Encapsulation**



Chapter 4

SSID and VLAN configuration

IEEE 802.11 and WBS-2400 Security Concepts

IEEE 802.11 security is supported by the WBS-2400.

Security Modes: Authentication and Encryption Methods

The following are the different combinations of security modes.

Table- 4.1 Authentication and Encryption Methods

Security Mode	Authentication Mode	Encryption Mode
None	• Open system	• None
WEP	• Open system • Shared key • Open system + Shared key	• WEP/40 • WEP/104
WPA	• PSK (Pre-shared key) • Radius	• TKIP • TKIP+WEP/40 • TKIP+WEP/104
WPA2	• PSK (Pre-shared key) • Radius • Mixed mode PSK • Mixed mode Radius • Mixed mode PSK + Radius	• AES • AES + TKIP

Authentication Combinations

WBS-2400 allows authentication of various types and in various combinations.

- The basic 802.11 authentications are Open (none) and Shared Key. In Shared Key Authentication, the WEP key is used as the shared key.

  If the SSID is configured to Open + Shared Key, this means that both types of clients can associate to the BST. This can be useful when the IT has another mechanism to determine the authentication of users in terms of his overall network, e.g. Capture Portal. There may be legacy clients that try to authenticate with Shared Key while others try to authenticate with Open. It is assumed that the encryption in this case is WEP but the WBS-2400 does not force this.

- In WPA, it is assumed that the basic 802.11 authentication is Open. WPA defines advanced authentications, either PSK (Pre-Shared Key) or RADIUS. In both cases, the initial keys (for broadcast and for unicast traffic) are determined during the last phase of the WPA authentication.

  When RADIUS Authentication is used, the RADIUS server can determine, in addition to the broadcast and unicast keys, the VLAN for the user belongs to (WBS-2400 supports multiple VLAN per SSID).

- The WBS-2400 has the capability to have an SSID that supports both RADIUS and PSK authentication. The exact method is decided according to the packet that comes from the client. If multiple VLAN are defined over such an SSID, a client that is authenticated using PSK gets assigned to the default VLAN, while the clients that authenticate using RADIUS have their VLAN determined by the RADIUS.

- Each SSID can have a different RADIUS server configured. This allows for the transportation of several networks over the same infrastructure of WBS-2400

Encryption Methods

Legacy 802.11 clients may connect Open (no encryption), or WEP.

In WEP, the encryption key can be either 40bit or 104bit.

In WPA, WBS-2400 supports TKIP encryption.

Since some clients may be legacy (supporting only WEP), WBS-2400 has the capability to have SSID that support both WEP and TKIP clients. In this case, the broadcast key is WEP, while the unicast key is either TKIP or WEP, depending on the way the client connected to the system. This mode is called TSN (Transient Security Network). ..

Note: When you configure a TSN SSID, configure the WEP key as key #2, since key #1 is used by TKIP.

QoS Packets Priority

Wireless Multimedia Extensions (WME), also known as WiFi MultiMedia (WMM), provides basic Quality of service (QoS) features to IEEE 802.11 networks. WMM prioritizes traffic according to four Access Categories (AC):

- Voice
- Video
- Best Effort
- Background

The four access categories and the implementation defined by WMM standard provide traffic prioritization. It is suitable for applications that require QoS over WiFi, such as Voice over IP (VoIP)

In order to allow QoS through the WBS-2400, both ends of the network (CPE on the wireless side and the switch/router on the Ethernet side) should support priority tagging. This permits the marking of a specific packet with a specific priority.

Downlink, a packet from the wire-line network is received at the WBS. Its priority is detected (base on the table below) and it will be prioritized over the air according to WMM AC prioritization. When the packet reaches the CPE, the CPE passes it to its LAN interface according to its definition.

Uplink, the CPE will detect the priority (as defined at the CPE) and will pass the frame with the correct WMM AC characteristics, thus providing the priority classification on the wireless side,.

Figure 3.19 **VLAN Tag (802.1p) Priority Marking Table**

Note: WBS should be set to work with tagged VLAN in order to support 802.1p QoS.

Figure 3.20 **DSCP (RFC4594) Priority Marking Table**

Figure 3.21 **TOS (IP Precedence) Priority Marking Table**

Figure 3.22 **DSCP (User Defined) Priority Marking Table**

Select two values (the range is 0 to 63) for each one of the AC. When getting DSCP equals to value1 or to value2, the map to the specified Access Category applies. Remaining values will be mapped to "Best Effort" AC.

The SSID-VLAN pages

SSID-VLAN is a sub-menu under the Wireless page in Network menu.

This page allows management of the security configuration. It is recommended to rename the SSID. The SSID is case sensitive and shorter than 32 characters.

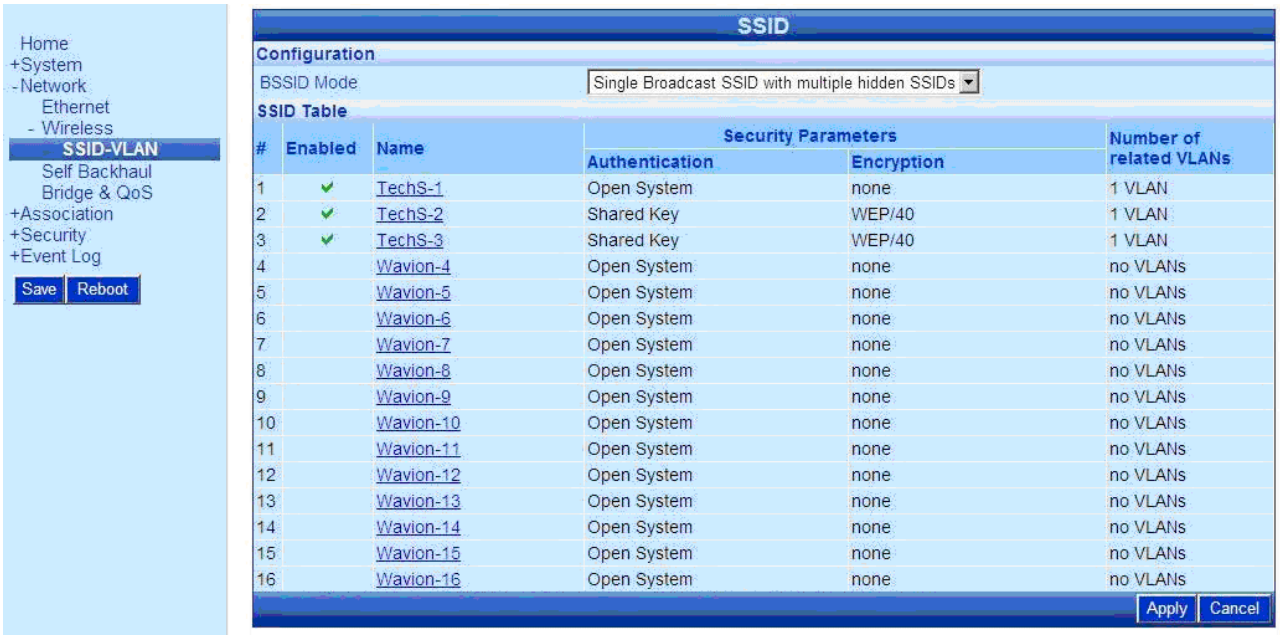
There are two operation modes:

- Single Broadcast SSID with multiple hidden SSID: (Default) All the SSID share the same BST MAC address. Only SSID #1 is broadcasted. This SSID cannot be disabled.
- Multiple broadcast SSID: Up to six broadcasted SSID (BSSID). Each SSID has a different BST MAC address. When this mode is enabled, the SSID-VLAN menu name is changed to BSSID. The fact that each additional BSSID causes more beacons to be transmitted over the air may cause a degradation of the system's capacity.

Each SSID has independent security credentials: Authentication method, RADIUS settings , encryption keys and QoS settings. The SSID handles the encryption used in both Unicast and Broadcast transmissions according to the keys.

The SSID are identified at the Ethernet side by a unique VLAN ID. In the event that multiple VLAN are on a single SSID (which can only be assigned by a RADIUS server), the SSID uses the appropriate VLAN key when communicating to a particular associated station. This insures that both unicast and broadcast transmissions are VLAN specific.

Figure 4.1 **SSID Table Page-Default mode**

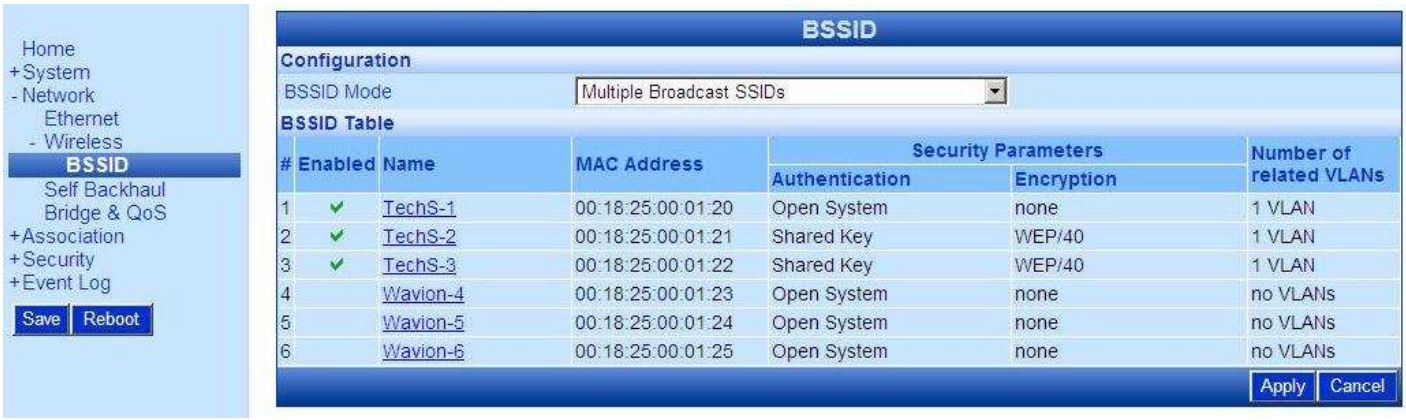

Home
+System
-Network
Ethernet
- Wireless
SSID-VLAN
Self Backhaul
Bridge & QoS
+Association
+Security
+Event Log
Save
Reboot
SSID
Configuration
BSSID Mode
Single Broadcast SSID with multiple hidden SSIDs
SSID Table
Enabled Name Security Parameters Number of related VLANs
Authentication Encryption
1 TechS-1 Open System none 1 VLAN
2 TechS-2 Shared Key WEP/40 1 VLAN
3 TechS-3 Shared Key WEP/40 1 VLAN
4 Wavion-4 Open System none no VLANs
5 Wavion-5 Open System none no VLANs
6 Wavion-6 Open System none no VLANs
7 Wavion-7 Open System none no VLANs
8 Wavion-8 Open System none no VLANs
9 Wavion-9 Open System none no VLANs
10 Wavion-10 Open System none no VLANs
11 Wavion-11 Open System none no VLANs
12 Wavion-12 Open System none no VLANs
13 Wavion-13 Open System none no VLANs
14 Wavion-14 Open System none no VLANs
15 Wavion-15 Open System none no VLANs
16 Wavion-16 Open System none no VLANs
Apply
Cancel

The following information is displayed on the SSID Table.

Table- 4.2 SSID Table

Field	Description
#	SSID index number
Enabled	Indicates whether the SSID is enabled or not
SSID Name	The full SSID string
Security Parameters	
Authentication	The specific Authentication method as defined for the SSID
Encryption	The specific Encryption method as defined for the SSID.
Number of Related VLAN	The number of VLAN that are related to the specific SSID.

Figure 4.2 **SSID Table Page-BSSID mode**



The following information is displayed on the BSSID Table.

Table- 4.3 BSSID Table

Field	Description
#	SSID index number
Enabled	Indicates whether the SSID is enabled or not
SSID Name	The full SSID string
MAC Address	The address to fill the BSSID field in the beacon of the specific broadcasted SSID
Security Parameters	
Authentication	The specific Authentication method as defined for the SSID
Encryption	The specific Encryption method as defined for the SSID.
Number of Related VLAN	The number of VLAN that are related to the specific SSID.

Note: Each enabled BSSID causes more beacons to be broadcasted over the air. This may cause degradation of the system's capacity.

Editing SSID/BSSID

Figure 4.3 **Editing SSID Page- default mode**

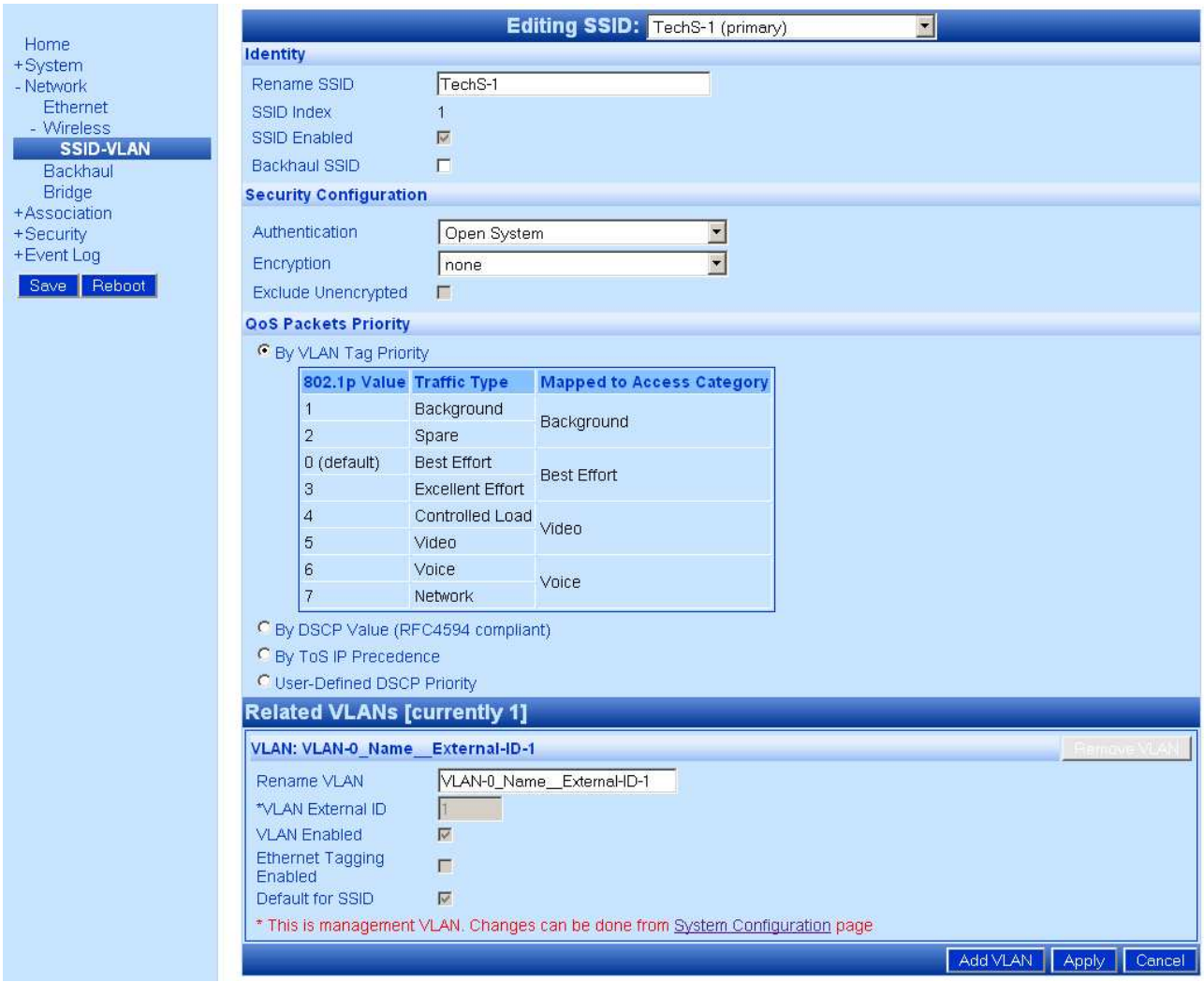
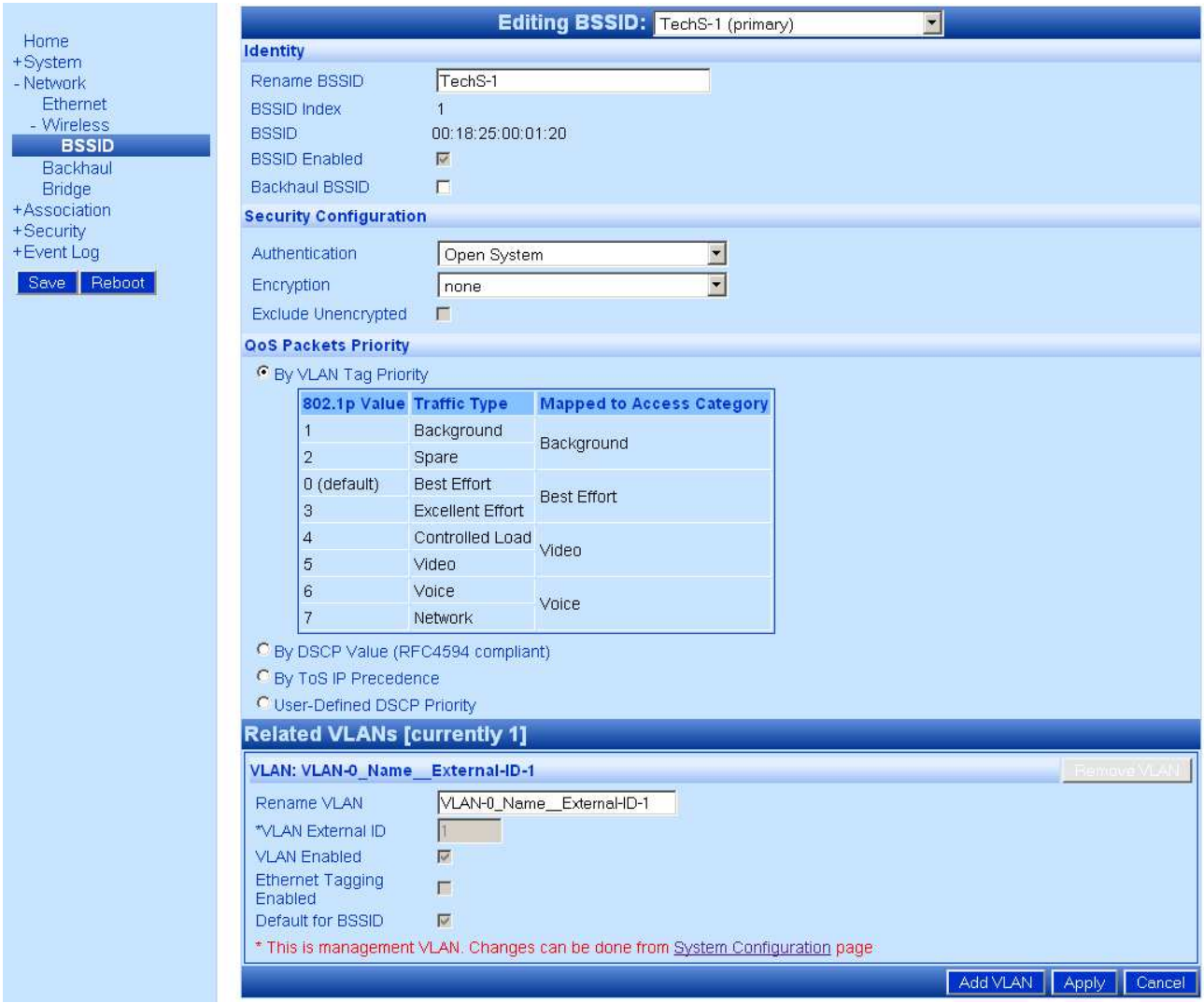


Figure 4.4 **Editing BSSID Page- BSSID mode**



The following fields appear on the Editing SSID/BSSID page. For more information about Security and QoS Configurations, see also Security Modes: Authentication and Encryption Methods and QoS packets priority

Table- 4.4 Editing SSID Page

Field	Description
Identity	
Rename SSID/BSSID	'Wavion' is the default SSID. Set new name for the SSID; the SSID is case-sensitive, and shorter than 32 characters
SSID/BSSID Index	It's a chronological numbering for the SSID Table
BSSID	MAC address attached to the SSID (only in BSSID mode)
SSID/BSSID Enabled	SSID #1 is always Enabled. SSID that are not enabled cannot be accessed from the wireless interface.
Backhaul SSID/BSSID	Check to enable the SSID/BSSID as a backhaul SSID. The VLAN configured won't be used at the Ethernet side. Trunked VLAN must be configured in different SSID/BSSID that won't be enabled (the VLAN must be enabled).
Security Configuration	
Authentication	Open System Shared Key Open System + Shared Key WPA PSK WPA Radius WPA2-PSK WPA2-Radius WPA2 mixed mode PSK WPA2 mixed mode Radius WPA2 mixed mode PSK + Radius
Encryption	None WEP/40 WEP/104 TKIP TKIP+WEP/40 TKIP+WEP/104 AES AES + TKIP
Exclude Unencrypted	When this checkbox is marked, the BST drops incoming packets that are unencrypted.
QoS Packets Priority	Choose the type of marking to be used when prioritizing data. • VLAN: Uses 802.1p priority tag.

Table- 4.4 Editing SSID Page

Field	Description
	• DSCP: Uses RFC4594 • TOS: Uses IP precedence Custom: User configuration of the DSCP field
Related VLAN	
VLAN: VLAN-0_Name_External-ID-1	Default VLAN name
Rename VLAN	Option to rename VLAN name for identification.
VLAN External ID	Configured VLAN number as configured on the backhaul LAN switch
VLAN Enabled	Enabled for the Primary SSID. Configurable for additional VLAN and SSID
Ethernet Tagging Enabled	Indicates whether 802.1q tagging is applied for this VLAN when used on the Ethernet interface.
Default for SSID/BSSID	In case there are few VLAN per SSID (applicable when the SSID is RADIUS Authenticated, and the RADIUS can determine which VLAN a client belong to), this marks which VLAN is the default VLAN for the SSID.
Options	
Apply	Click to have your changes take effect temporarily
Save (from the menu)	Click to have your changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

Security Configuration

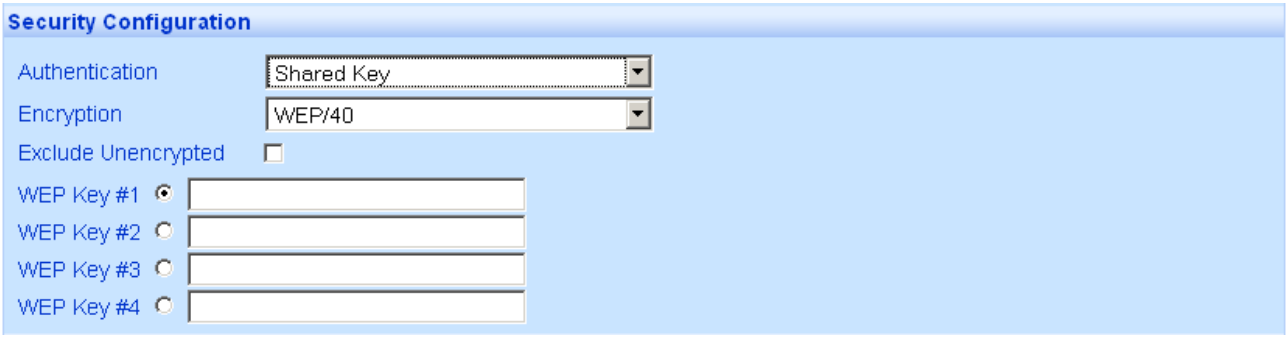
After editing the SSID, the security must be set. The following pages describe the process to set several security configurations. Pictures and indications refer to SSID mode. The process in BSSID mode is the same.

Configuring WEP Security

To configure WEP Security pages

- Click the Encryption drop down menu and select WEP in the Editing SSID page (See figure below).
- Select from the Authentication choices either Open or Shared Key. Shared Key is recommended.
- Select either WEP/40 or WEP/104 from the Encryption choice.
- Enter up to 4 WEP keys. Their length is dependent upon the choice selected in the step above; WEP/40 is 10 hex characters and WPE/104 is 26 characters.

Figure 4.5 **WEP Encryption**



The following fields appear on the Editing SSID WEP page:

Table- 4.5 Editing SSID WEP Page

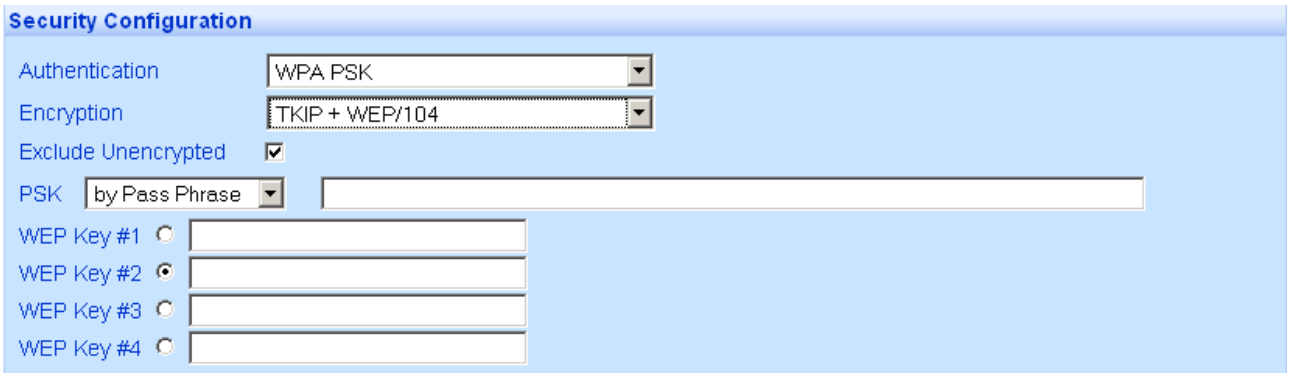
Field	Description
Security Configuration	
WEP Key #	The key # (1-4) indicates the index of the WEP Key. The Key value is the hexadecimal value of the WEP key as stored in HW. For the WEP/40 this key holds 10 hexadecimal characters, for WEP/104 this key holds 26 hexadecimal characters.
Options	
Apply	Click to have changes take effect temporarily
Save (from the Menu)	Click to have changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

Configuring WPA Security

To configure WPA Security

- From the Authentication drop down menu, select either WPA PSK or WPA RADIUS.
- Select TKIP, TKIP + WEP/40 or TKIP + WEP/104 from the Encryption choice.
- For the Security Keys, select either by Value or by Pass Phrase and enter the appropriate value

Figure 4.6 **WPA Security Mode**



Configuring RADIUS Server Parameters

- In case RADIUS Authentication is required choose WPA Radius from the Authentication drop down menu to open the Radius Servers configuration.
- Each SSID can be configured with its own RADIUS server

Figure 4.7 **WPA Radius Servers Configuration**

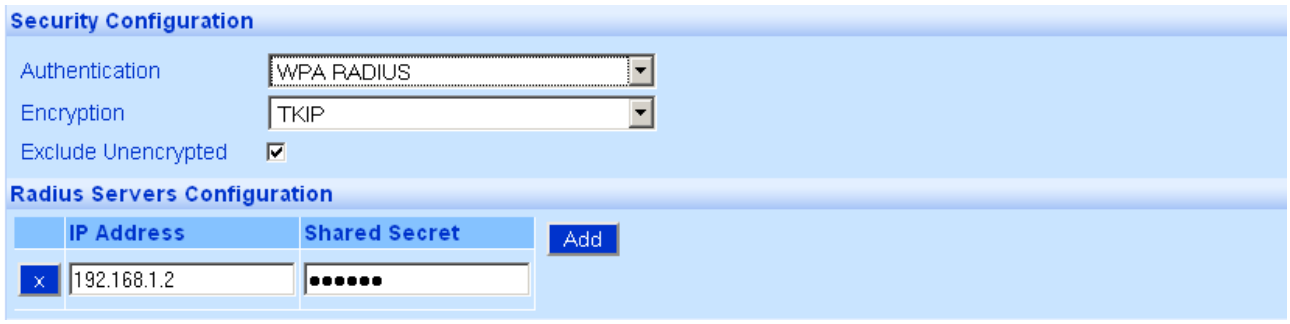


Table- 4.6 RADIUS Servers Configuration

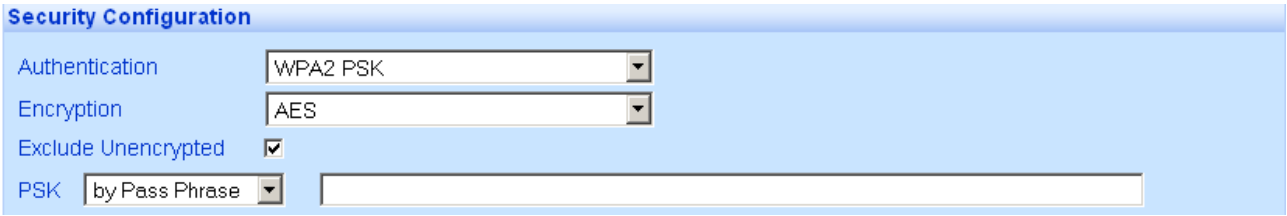
Field	Description
RADIUS Server IP Address	IP Address of the RADIUS Server. If more than 1 address appears in the list, the following RADIUS Servers are used as backup (only if the previous RADIUS Servers cannot be reached).
Shared Secret	The Shared Secret is a secret that the unit shares with the RADIUS server. This way, both ends know they are "certified".
Options	
Apply	Click to have your changes take effect temporarily
Save (from the menu)	Click to have your changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

Configuring WPA2 Security

To configure WPA2 Security

- Click on the SSID-VLAN Menu (See figure below).
- From the Authentication drop down menu, select either WPA2 PSK or WPA2 RADIUS.
- Select AES from the Encryption choice.
- For the Security Keys, select either by Value or by Pass Phrase and enter the appropriate value

Figure 4.8 **WPA2 Security Mode**



Configuring RADIUS Server Parameters

- In case RADIUS Authentication is required choose WPA2 Radius from the Authentication drop down menu to open the Radius Servers configuration.
- Each SSID can be configured with its own RADIUS server

Figure 4.9 **WPA2 Radius Servers Configuration**

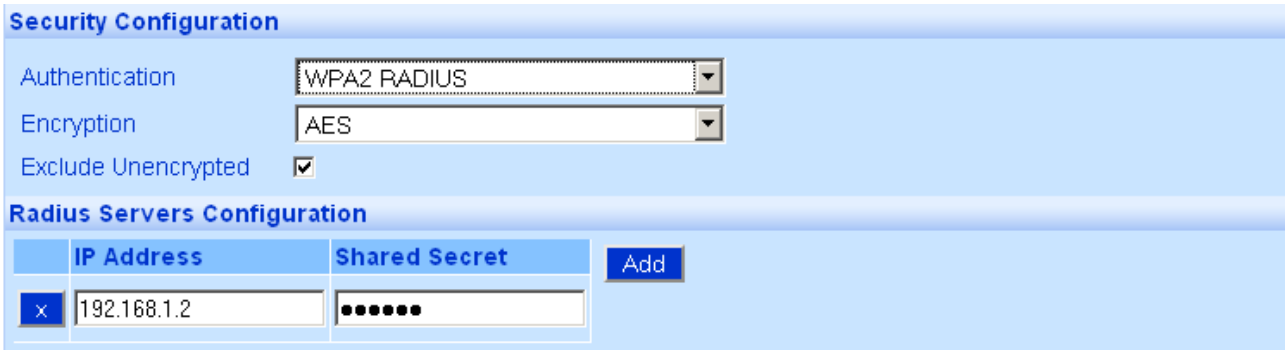


Table- 4.7 RADIUS Servers Configuration

Field	Description
RADIUS Server IP Address	IP Address of the RADIUS Server. If more than 1 address appears in the list, the following RADIUS Servers are used as backup (only if the previous RADIUS Servers cannot be reached).
Shared Secret	The Shared Secret is a secret that the unit shares with the RADIUS server. This way, both ends know they are "certified".
Options	
Apply	Click to have your changes take effect temporarily
Save (from the menu)	Click to have your changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

VLAN Configuration

Tagging VLAN

It is possible to create several networks working in parallel on the same WBS-2400. This is performed creating several SSID mapped to several VLAN. Each SSID will represent a different broadcast domain, isolated from other SSID using different broadcast keys. On the Ethernet side the broadcast domains are separated by VLAN.

When configuring more than one SSID per WBS unit, VLAN must be created. Each VLAN should be tagged with a different VLAN ID so the networks can be identified at the backbone entry.

The default VLAN has the VLAN ID equal to 1, but by default the tagging is disabled leaving the data untagged.

By default, all management traffic to and from WBS-2400 is on VLAN ID 1. It is a good practice to create a VLAN dedicated to the management of the unit. See Management VLAN section for more information.

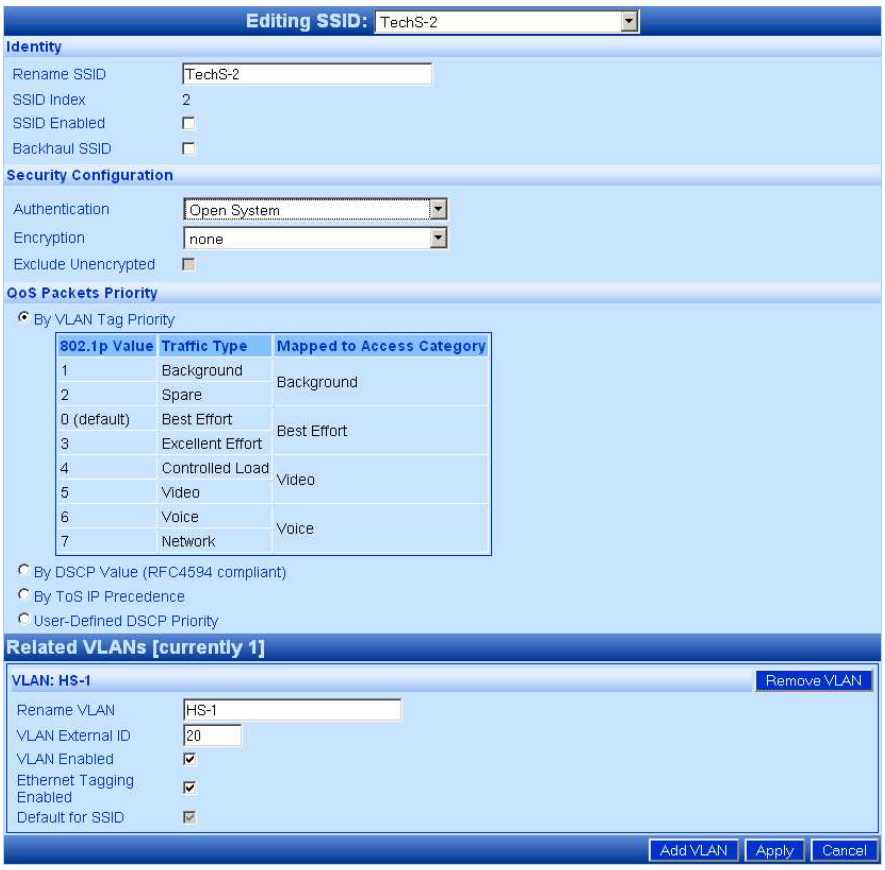
The following pages describe the process to set VLAN. Pictures and indications refer to SSID mode. The process in BSSID mode is the same.

Configuring VLAN

To configure a VLAN

From the main SSID-VLAN Select an SSID name to edit its parameters (e.g. TechS-2) to edit its parameters.

Figure 4.10 **Editing SSID Page with Related VLAN Section**



1. Click Add VLAN at the bottom right of the window to configure the VLAN Parameters. The Related VLAN section of the page is displayed.

2. In the Rename SSID field, enter an SSID Name to be used.
3. Check the SSID Enabled checkbox. This enables the SSID.
4. Check whether this SSID is a Backhaul SSID (See Backhaul CPE)
5. Configure all security parameters: Authentication, and Encryption as required (See Security Configurations).
6. Configure the QoS Priorization (See QoS Priorization Settings)
7. Within the Related VLAN edit the VLAN Name
8. Select a VLAN ID. This ID should be unique and must be supported by the backbone equipment that is connected to the WBS through the Ethernet port.
9. Ensure the Ethernet Tagging Enable is checked.
10. Make sure the VLAN and SSID are enabled by marking the VLAN Enabled and SSID enabled checkbox respectively.
11. Click Apply.

Configuring Multiple VLANS per SSID

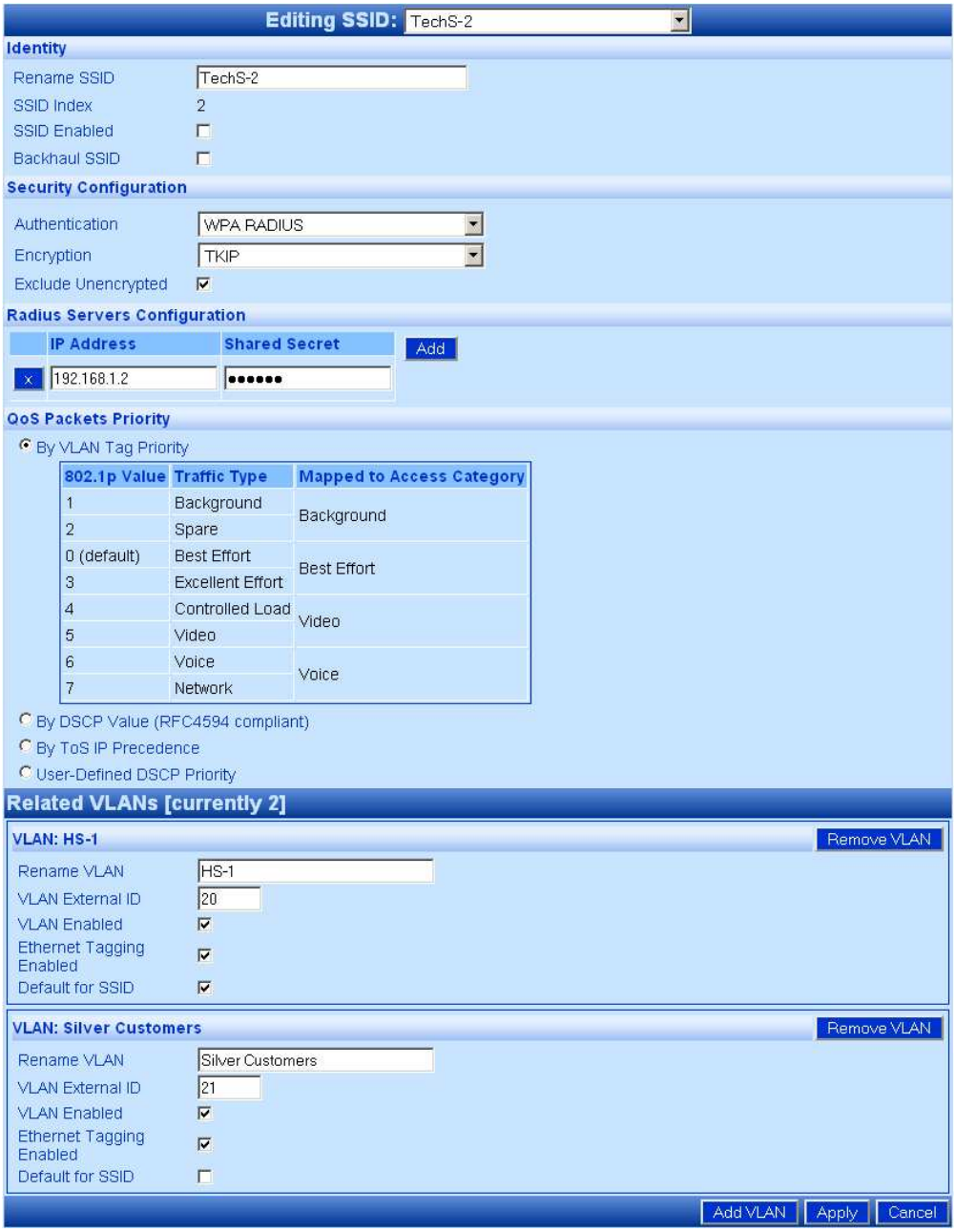
The SSID acts as a "security template" - it determines the general security mode (WPA, WEP, etc.). The Security details (the keys themselves) are linked to the VLAN. Therefore, there is an option to assign multiple VLAN to the same "security template" which is the SSID.

This option is applicable only when another authority (i.e. RADIUS Server that supports VLAN assignment) is involved in the Authentication process. The RADIUS can determine the exact VLAN that the connecting client is bound to after the Authentication process is completed.

Perform steps 1-10 in Configuring VLAN above.

In the Security Configuration, under Authentication, if you select WPA RADIUS you enable RADIUS authentication. In this case, there is an option to edit multiple VLAN, one after the other. You can add VLAN by pressing the "Add VLAN" button. There can be up to 16 VLAN in the overall system in SSID-VLAN, and up to 6 in BSSID mode.

Figure 4.11 **Editing SSID with RADIUS -- Multiple VLAN**



Only one VLAN has the Default for SSID checkbox marked. This indicates to the WBS-2400 which is the default VLAN when authentication on the SSID is performed and the RADIUS does not provide the assignment to VLAN (this is to avoid possible configuration problems in the RADIUS).

Make sure you configure the RADIUS server to handle clients on multiple VLAN.

Make sure that access to the RADIUS Server, including the Shared Secret, is configured correctly.

Management VLAN

The purpose of the management VLAN is to segment the Management and the Clients data traffic. It also provides an option for customers to keep an Open SSID for public traffic and simultaneously manage the WBS-2400 traffic over a separate VLAN (that may be linked to a secured SSID). The management VLAN can be selected out of the enabled VLAN list.

Note: Only one VLAN can be defined as the Management VLAN in the WBS-2400 system.

The configuration of the Management VLAN takes effect immediately.

This means that setting the Management VLAN has to be done in 2 steps:

4. Applying the VLAN parameters (external VLAN ID and tagging mode) using the existing management traffic, and selecting the desired VLAN to be the Management VLAN on the Administration page. After this stage the current wire-line connection to the system GUI will drop.
5. Saving the parameters – using the new Management VLAN, i.e. over the tagged VLAN.

To enable VLAN management

6. Apply the VLAN parameters (external VLAN ID and tagging mode) using the existing management traffic or create a new VLAN ID.
7. Select the desired VLAN ID for the Management VLAN traffic.
8. Click Apply and Save

Note: The configuration of the Management VLAN takes effect immediately. Therefore setting the Management VLAN is done over the "old" VLAN (default is VLAN-1 untagged), while saving is done over the "new" VLAN.

Step 8 has to be done over a different machine over the new VLAN.

Chapter 5

Viewing Associated Stations

The Association menu item allows you to view parameters of stations associated to the system.

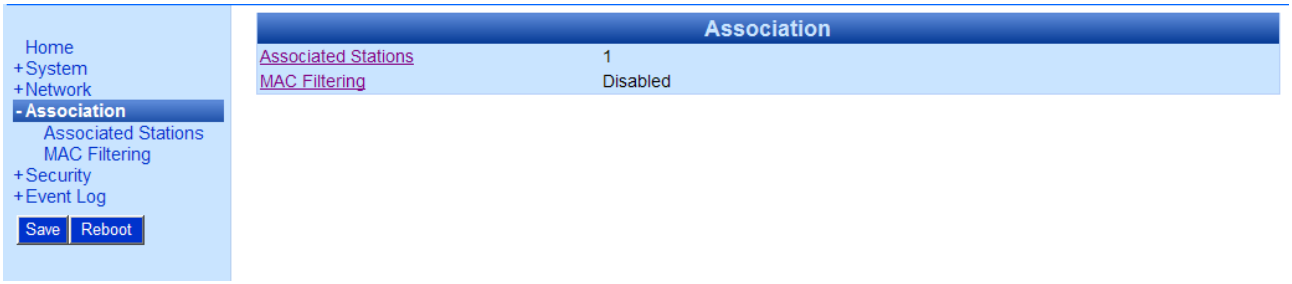
Viewing Stations

To view a summary of associated stations

- Click the Association menu item.

The following summary chart appears if there are associated stations in the system.

Figure 5.1 **Association Statistics**



The following fields appear on the Association Statistics page:

Table- 5.1 Associated Stations page

Field	Description
Associated Stations	Links to list of Associated Stations and number of associated stations
MAC Filtering	Status

Viewing Associated Stations

You can view a summary list of associated stations and their parameters

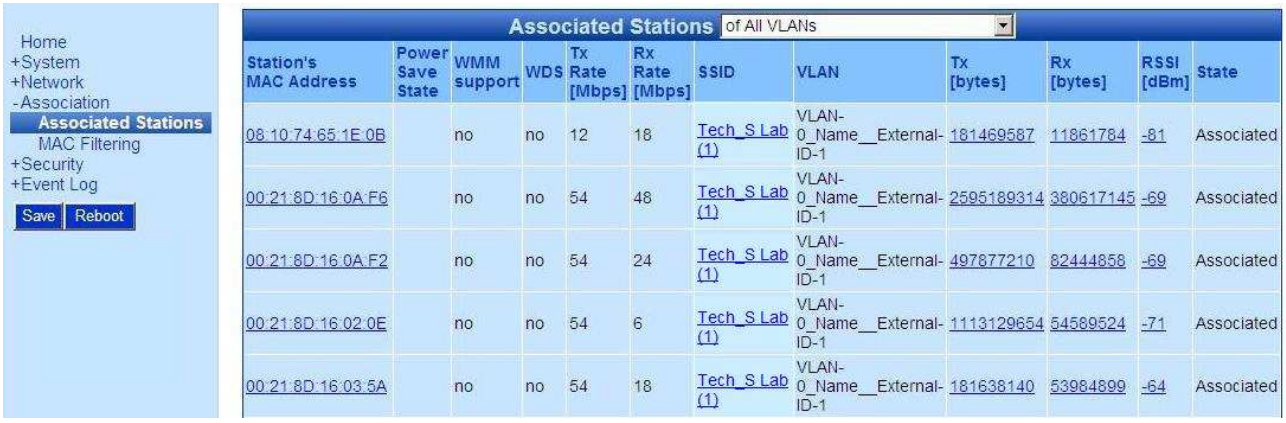
To view a summary list of stations and parameters

1.1. Click Association on the menu.

Click Associated Stations on the menu bar or on the summary screen

The Associated Stations page is displayed.

Figure 5.2 **Associated Stations Page**



The following fields appear on the Associated Stations page:

Table- 5.2 Associated Stations of VLAN page

Field	Description
Title	
Station's MAC Address	MAC (Media Access Control) address of the associated station
Power Save State	Value of Doze in this field indicates that the associated station is in power save mode
WMM support	Value of 'yes' in this field indicates that the associated station supports the WMM protocol. . For more information about working with QoS please refer to "QoS Packet Priority"
WDS	WDS enables preserving MAC addresses of client packets across the wireless links. Value of 'yes' in this field means the CPE supports WDS protocol. The supported CPE are Ubiquity NS2/PS2/NS5/PS5 running

	version 3.2.2, and Ruckus running version 4.4.2.0.28.
Tx Rate [Mbps]	PHY Rate (modulation) at which the base station currently transmits to the associated station
Rx Rate [Mbps]	PHY Rate (modulation) at which the associated station currently transmits to the base station
SSID	SSID to which the associated station is associated
VLAN	VLAN name to which the station is bound.
Tx[Bytes]	Number of bytes transmitted by BST to the station
Rx[Bytes]	Number of bytes received by the BST from the station
RSSI[dBm]	The Received Signal Strength Indicator power received by the BST from the associated station.
State	State of which the station is connected
Reset Counters	Reset the Tx and Rx bytes counters
Add to white list	When MAC filtering is active, adds the specific station to a list of accepted clients.

Viewing Specific Stations

You can view detailed information about a specific station.

To view detailed information about a specific station

- In the Associated Stations summary page, click the Station's MAC Address for the specific station.

  The Station Information tab is displayed for the associated station.

Figure 5.3 **Station Information tab**

The following information is displayed under the Station Information tab:

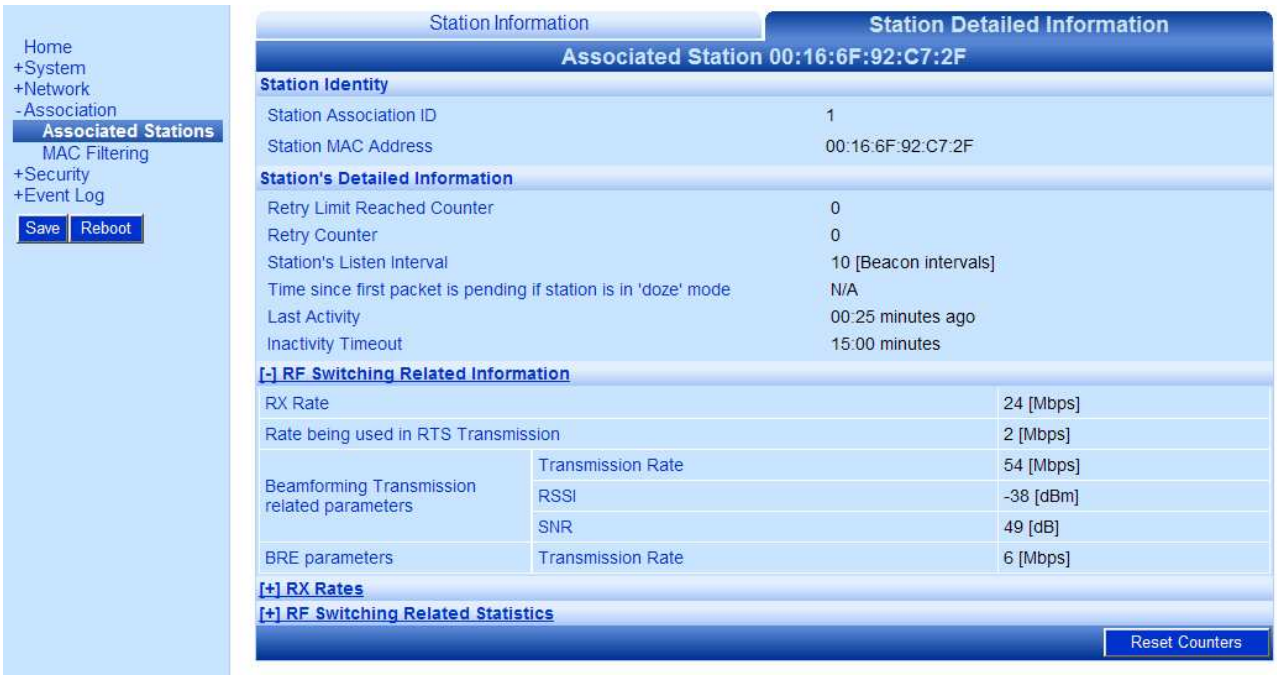
Table- 5.3 Station Information tab

Field	Description
Station Properties	
MAC Address	MAC (Media Access Control) address of the associated station
Power Save State	Value of Doze in this field indicates that the associated station is in power save mode
Station dot11 Type	Indicates whether the station is 802.11g or 802.11b.
WMM Support	Value of 'yes' in this field indicates that the associated station supports the WMM protocol- . For more information about working with QoS please refer to "QoS in WBS-2400"
WDS	Value of 'yes' in this field means the CPE supports WDS protocol. The supported CPE are Ubiquity NS2/PS2/NS5/PS5 running version 3.2.2, and Ruckus running version 4.4.2.0.28.
Supported Rates [Mbps]	PHY Rates (modulation) at which the associated station can communicate
Preamble Type	The preamble types may be Short or Long
Short Slot - Time	This field indicates whether the client supports Short Slot Time
Encryption Used	The type of encryption used to communicate with this client.
BST/Station Communication Counters	
Transmission Counter	Total transmission to the station shown in number of packets and number of bytes
Reception Counter	Total reception from the station shown in number of packets and number of bytes

You can select the Station Detailed Information tab to view more details about the same station. This page is long, having a plus sign to click for more information. The page is shown here in two separate figures.

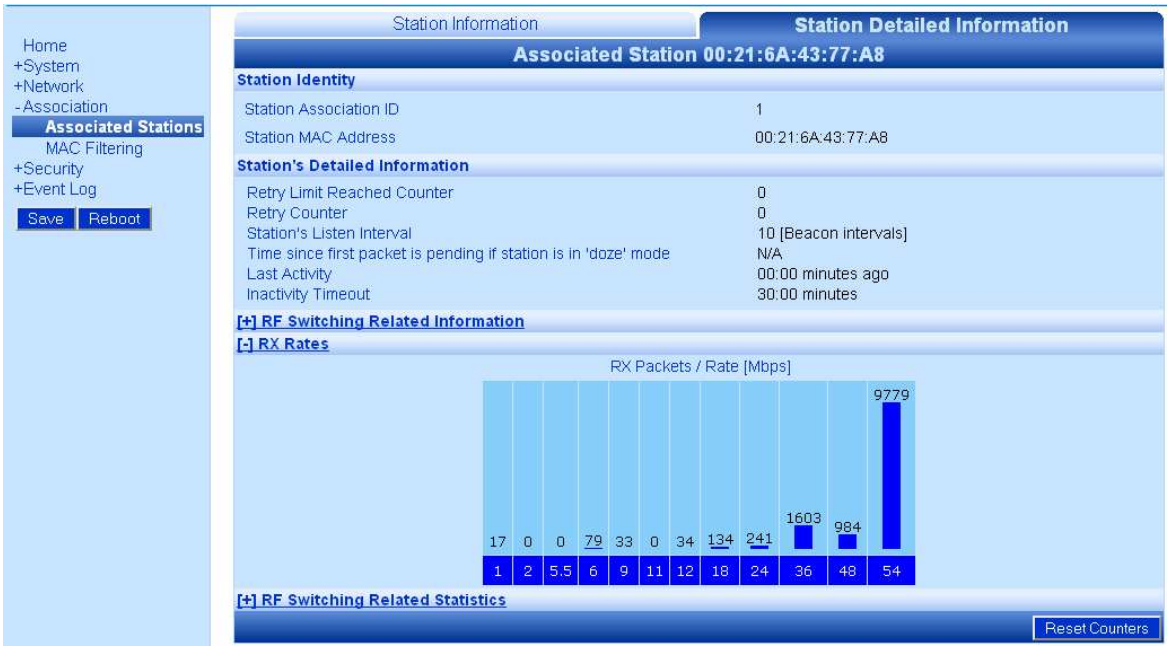
Figure 5.4 **Station Detailed Information tab part 1**

In the above screen, the top of the tab is shown. RF Switching Related Information page is shown when the plus [+] sign is clicked.



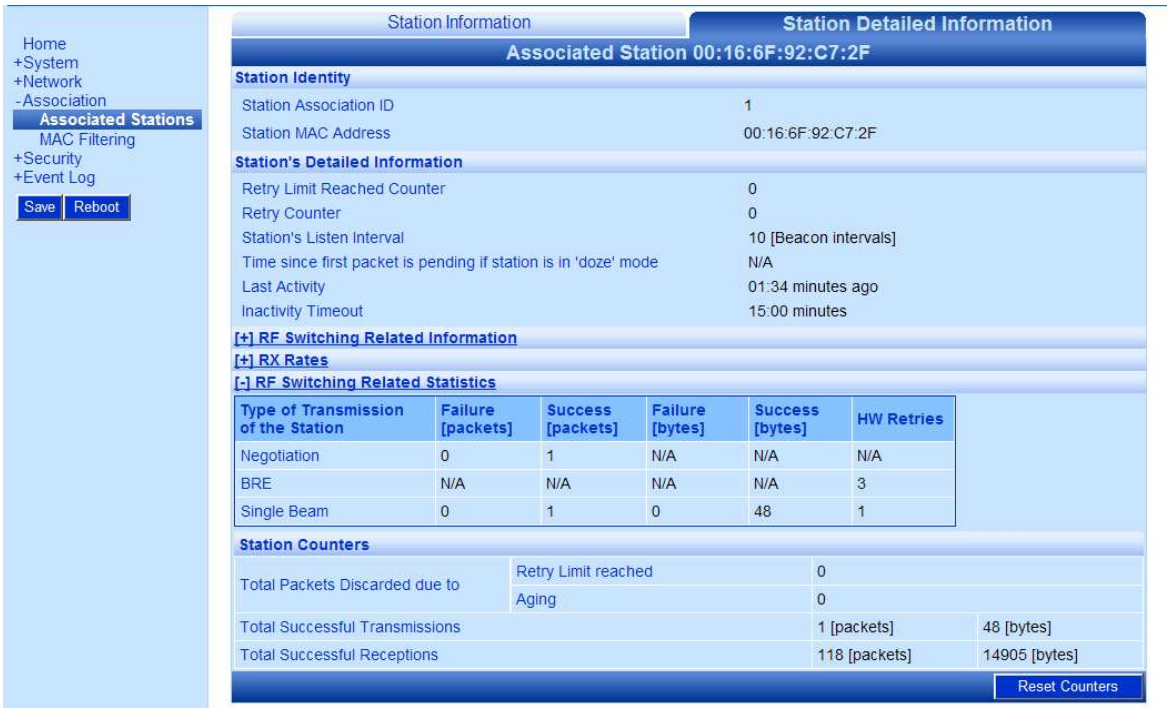
The Rx Rates are shown in the same way:

Figure 5.5 **Station Detailed Information tab part 2**



And the RF Switching Related Statistics:

Figure 5.6 **Station Detailed Information tab part 3**



The following information is displayed in the Station Detailed Information tab.

Table- 5.4 Station Detailed Information tab

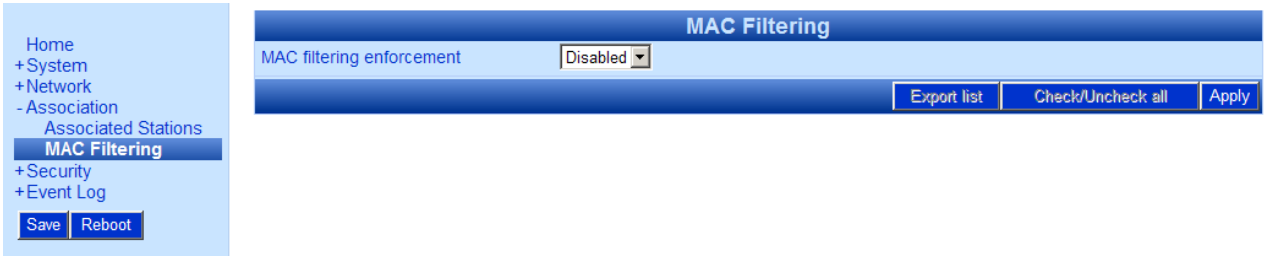
Field	Description
Station Identity	
Station Association ID	The Association ID (AID) that the client got when its association to the BST was completed.
Station MAC Address	MAC (Media Access Control) address of the associated station.
Station's Detailed Information	
Retry Limit Reached Counter	This counter increment every time the Retry Counter (below) reaches its limit (64).
Retry Counter	A counter of the retransmissions to this associated station.
Station's Listen Interval	The listen interval of the client specified during association to the BST.
Time since first packet is pending if station is in Doze mode	If station is in Power Save mode, the amount of time for which the first packet received is waiting to be delivered
Last Activity	Number of minutes since the station was last active.
Inactivity Timeout	If a station is not active for this number of minutes, the BST will de-authenticate it due to inactivity.
RF Switching Related Information	Click + sign to display this information/ click - sign to hide
RX Rate	PHY Rate (modulation) at which the associated station currently transmits to the base station
Rate being used in RTS Transmission	The PHY rate (modulation) that the BST uses for transmission of Self-CTS and RTS transmissions to the client.
Beamforming Transmission related parameters:	
Transmission Rate[Mbps]	The PHY rate (modulation) that is used in Beamforming transmission to this client.
RSSI[dBm]	RSSI -- Received Signal Strength Indication as the client is received by the BST.
SNR[dB]	SNR -- Signal to Noise Ratio (dB) as the client is received by the BST.
BRE parameters: Transmission Rate	BRE - Broadcast Range Enhancement. The PHY rate (modulation) in which the BST broadcasts are being transmitted.

RX Rates	Number of packets received in each one of the operational rates – The dispersion of the rates of the packets received shows if there is any significant interference
RF Switching Related Statistics	Click + sign to display this information/ click - sign to hide
Type of Transmission of the Station	• Negotiation • BRE • Single beam (beamforming) For each of the BST transmission types to the station, the following transmission statistics are displayed:
Failure (packets)	Number of packets that failed to be transmitted. This number only applies to Negotiation and Single Beam (beamforming) transmissions and indicates packets which did not receive an ACK response.
Success (packets)	Number of packets transmitted successfully. This count is applicable to Negotiation and Single beam (Beamforming) transmissions and indicates those that received an Acknowledgement (ACK).
Failure [Bytes]	Number of bytes that failed to be transmitted. This is only applicable to single beam (Beamforming) transmissions as they are the only variable length transmissions that receive ACKs.
Success [Bytes]	Number of bytes that were transmitted successfully. This is only applicable to single beam (Beamforming) transmissions as they are the only variable length transmissions that receive ACKs.
HW Retries	Number of hardware retries that were used for the specific transmission type. Negotiation packets are not automatically retried by the hardware, therefore, this count only applies to BRE and Single beam.
Station Counters	
Total Packets Discarded due to	• Retry Limited reached -- Number of undelivered packets that were discarded following maximum number of transmission retries • Aging -- Number of undelivered packets that were discarded because aging-timeout is exceeded
Total Successful Transmissions	• Total successful transmissions delivered to the client [packets] • Total successful transmissions delivered to the client [bytes]
Total Successful Receptions	• Total successful transmissions received from the client [packets] • Total successful transmissions received from the client [bytes]

MAC Filtering

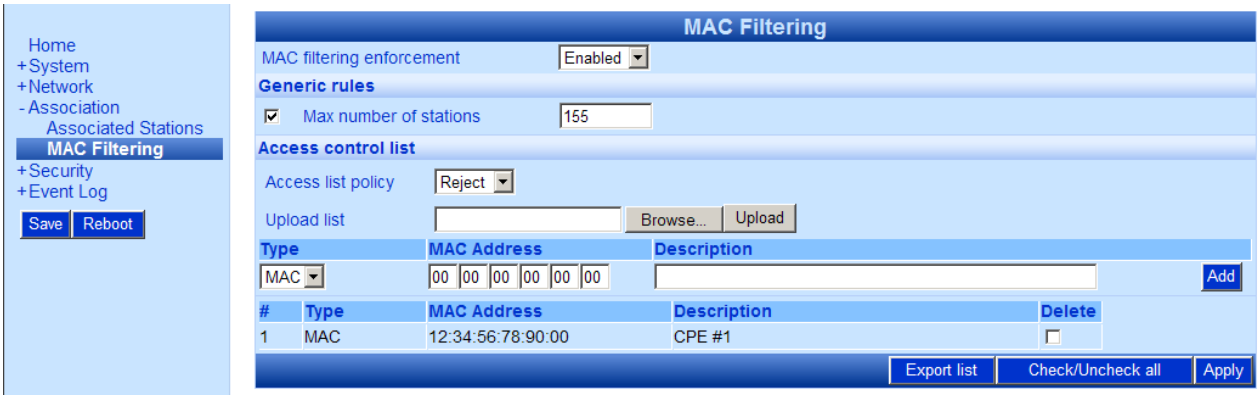
MAC filtering is a feature that enables the user to limit the maximal number of stations to be associated to the WBS-2400. It also allows the creation of "white" or "black" lists to control the identity of the stations to be associated.

Figure 5.7 **MAC Filtering main page**



When MAC filtering is enabled, the following fields appear:

Figure 5.8 **MAC Filtering options**



Field	Description
Generic rules	
Max number of stations	Maximal number of stations allowed to connect. Any connection request after the maximal number of connections is reached will be refused. The value range is from 0 to 238.
Access control list	
Access list policy	• Reject: a connection request from the MAC addresses listed will be rejected ("black list") • Accept: only connection requests from the MAC addresses listed will be accepted ("white

Field	Description
	list”)
Upload list	Upload a list of MAC addresses. The file type should be .CSV . This is helpful to import lists from other BST or systems.
To create an entry in the MAC list	• Type: MAC or OUI (the first 3 bytes of the MAC address) • MAC address: MAC address or OUI • Description Press “Add” A maximum of 1000 entries can be added. After all the entries are created, press “Apply” and “Save”
Maintenance buttons	
Export List	The list can be exported to a .CSV file named “mac_filtering.csv” for backup.
Check/Uncheck all	Selects/deselects all the entries in the list for easy deletion
Apply	Applies the changes

Chapter 6

Managing System and Station Security

You can manage system users and their passwords, as well as system security parameters. This chapter covers the following main areas:

- Administration
- Authentication

Viewing the Security Page

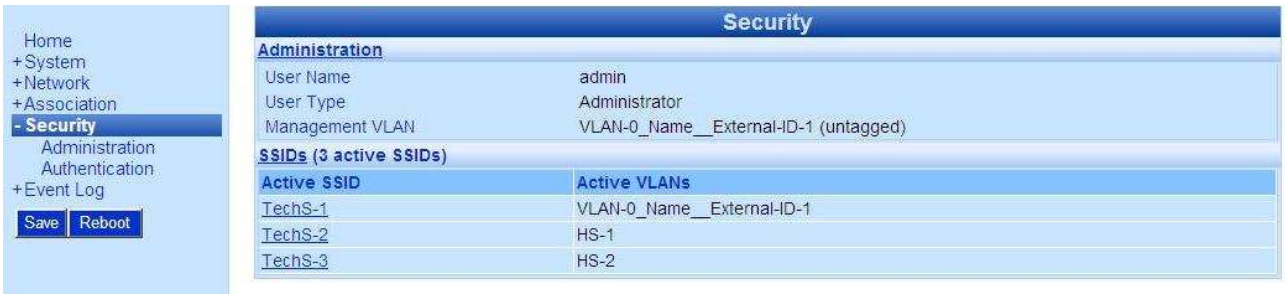
The Security page displays a summary of the different types of security information: administration, authentication, and SSID/VLAN data.

To view the Security page

- Click Security in the menu.

  The Security page displays.

Figure 6.1 **Security Page**



The following fields appear on the Security page:

Table- 6.1 Security Page

Field	Description
Administration	links to the Management Configuration page
User Name	User name of current user
User Type	The security level of the current user: Administrator/Viewer
SSID	The list of active SSID
Active SSID	Identifier name of each active SSID
Active VLAN	List of Active VLAN

Viewing the Management Configuration Page

The Management Configuration page is used for overall system user and configuration management. You can add new users, change passwords, and update the SNMP. Each section is separate, and has its own Apply and Cancel buttons.

To view the Management Configuration page

- Click Administration, either from the Security page, or from the menu bar, as a sub-menu under the Security item.

  The Management Configuration page displays.

Figure 6.2 **Management Configuration Page**

The following fields appear on the Management Configuration page:

Table- 6.2 Management Configuration page

Field	Description
HTTP/CLI Users	Use to change password or add new users to manage the unit; see below
User Name	When registering a new user, enter user name; user name is case sensitive
User Type	User type is selected when registering a new user Administrator/Viewer
New Password	Use this field to insert new user's password or to change existing password
Confirm Password	When registering a new user, or changing a password, re-enter the above password to verify that the password is correct.
Options	Click buttons in this section with respect to new and current users
Apply	Click to have changes take effect temporarily
Save (on menu bar)	Click to have changes made on this page remain even after a reboot
Cancel	Click to clear changes made; Cancel only works on changes where neither Save or Apply was clicked
SNMP Configuration	
SNMP Enabled	If checkbox is marked, indicates that SNMP is enabled
SNMP Version (V2 or V3)	Lists SNMP version
SNMP Read Community SNMP Write Community	SNMP Read and Write community strings authenticate access to MIB objects and function as embedded passwords
Options	Click buttons in this section with respect to changes made in the SNMP section
Apply	Click to have changes take effect temporarily
Save (on menu bar)	Click to have changes made on this page remain even after a reboot
Cancel	Click to clear changes made; Cancel only works on changes where neither Save or Apply was clicked

Table- 6.2 Management Configuration page

Field	Description
HTTP Configuration	Use this section to enable secure browsing by creating an SSL certificate See below
Enable Secure Browsing (SSL only)	If the checkbox is marked, it indicates Secure Browsing (SSL) is enabled, and non-secured browsing is disabled.
Create new SSL certificate (using the following identifiers	If the checkbox is marked a new SSL certificate will be created using the following identifiers:
System Name	An administratively-assigned name for this managed node
Domain Name	An administratively-assigned node's domain name
Options	Click buttons in this section with respect to changes made in the HTTP Configuration section
Apply	Click to have changes take effect temporarily
Save (on menu bar)	Click to have changes made on this page remain even after a reboot.
Cancel	Click to clear changes made; Cancel only works on changes where neither Save or Apply was clicked

To change a password

In the HTTP/CLI Users section, select the user name for which you want to change the password in the username dropdown box.

Enter a new password in the New Password field. A password contains at least 6 characters.

Re-enter the new password in the Confirm Password field.

Click Apply.

Confirmation pop-up box is displayed.

Click OK.

Click Save for the password change to remain after a reboot.

To add a new user to the system

In the HTTP/CLI Users section, select (new) from the User Name dropdown list.

A New User field appears.

Enter a new user name in the field.

Select a user type from the user type dropdown list, either Administrator or Viewer.

Enter a password in the Password field. A password must contain at least 6 characters.

Re-enter the password in the Confirm Password field.

Click Apply.

Click Save to retain the new user after a reboot.

HTTP Configuration

To enable secure browsing/create an SSL certificate

In the HTTP Configuration section, select Enable Secure Browsing.

Select Create new SSL certificate.

Enter the system name.

Enter the domain name.

Click Apply.

A popup asks if you want to enable only SSL browsing (HTTPS).

Click OK.

Viewing the Authentication Pages

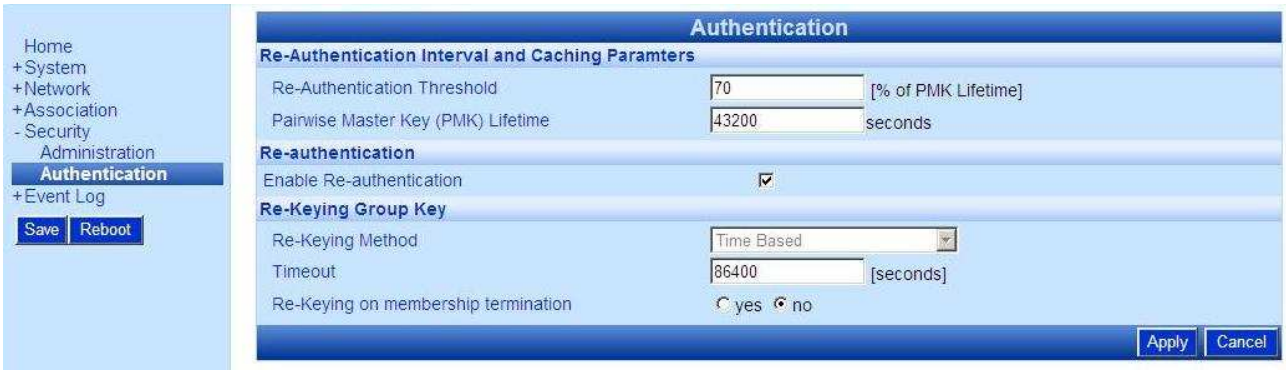
The Authentication pages allow you to configure authentication parameters.

To view the Authentication pages

- Click Authentication, either from the Security page, or from the menu bar, as a sub-menu under the Security item.

  The Authentication pages display.

Figure 6.3 **Authentication Tab**



The following fields appear on the Authentication tab.

Table- 6.3 Authentication tab

Field	Description
Re-Authentication interval and Caching Parameters	
Re-Authentication Threshold	It indicates the threshold in time after which the re-authentication will occur. By default, after 70% of 43200 seconds which is 8.4hours, each client will have to pass re-authentication.
Pairwise master Key (PMK) Lifetime	The pairwise master key lifetime indicates the time in seconds that the pairwise key (the key used for encrypting unicast traffic) is valid in the WBS-2400 cache. PML default value is 43200 seconds or 12 hours.
Re-Authentication	
Enable Re-Authentication	Indicates whether periodic EAP re-authentication process occurs. The intervals in which re-authentication shall occur can be specified on the RADIUS server. Alternatively, default values for re-authentication intervals are specified as WBS-2400 parameters (the first two fields on this page).
Re-Keying Group Key	
Re-Keying Method	For WPA SSID, the administrator determines if and how often re-keying of broadcast keys occurs.

Table- 6.3 Authentication tab

Field	Description
	• Disabled - no re-keying • Time Based - re-keying after a certain time • Packet Counter Based - re-keying when group (broadcast) packet counter reaches a certain level (modifiable field)
Timeout (seconds)	After this timeout, re-keying occurs if re-keying method is 'Time Based' (modifiable field)
Packet Threshold	Group broadcast packets' threshold after which re-keying occurs if the method is 'Packet Counter Based'; the value is inserted as multiplication of 1000 packets
Re-Keying on membership termination	Indicates whether a group key re-keying occurs when a client is disassociated from the group.
Options	
Apply	Click to have changes take effect temporarily
Save (from the menu)	Click to have changes made on this page remain even after a reboot.
Cancel	Click to clear changes made; Cancel only works on changes where neither Save or Apply was clicked

Modifiable fields on this page are indicated in the table.

Chapter 7

Viewing Events

You can view and configure logs of system events.

Viewing the Most Recent Events

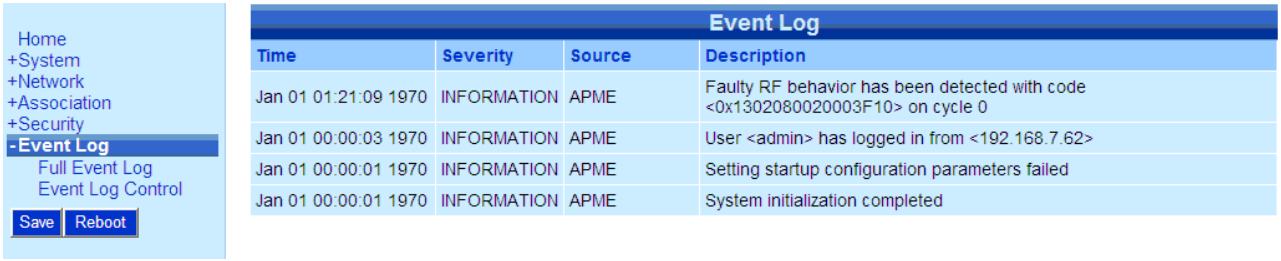
The Event Log page displays the systems most recent events.

To display the event log

- Click Event Log in the menu.

The log of most recent system events displays.

Figure 8.1 **Event Log**



The following fields appear on the Event Log page:

Table- 7.1 Event Log page

Field	Description
Time Since Uptime	The time the event occurred. The time of 0 is the time the system was last rebooted. This time will be synchronized with the NTP server data .

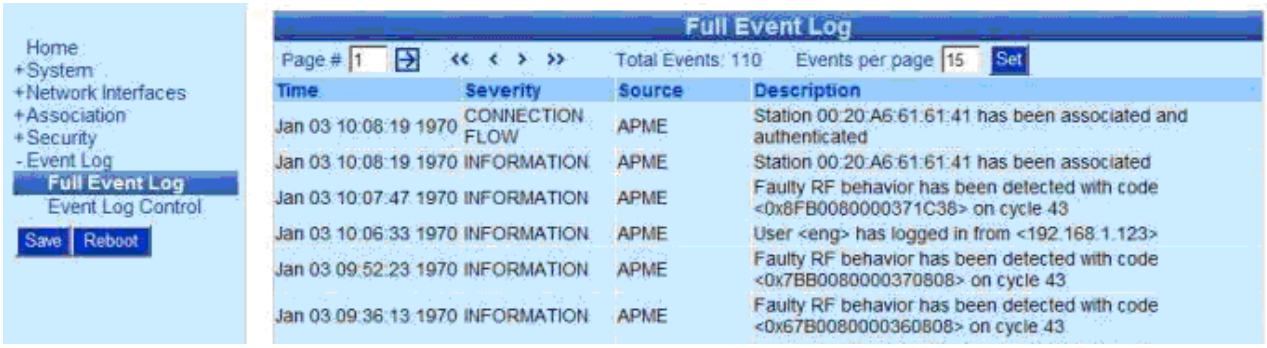
Table- 7.1 Event Log page

Field	Description
Severity	The severity of the event showing how serious event is: Information, Connection Flow, Warning, Critical, or the event type (e.g. Connection Flow)
Source	System module reporting the event
Description	Complete description of circumstances of event

Viewing the Full Event Log

Clicking the Full Event Log menu item displays the Full Event Log page. This page displays all the events in the internal log file since the system was rebooted or since the file was overwritten. At the top of the page are controls allowing you to navigate through the pages, and select how many events are shown per page.

Figure 8.2 **Full Event Log Page**



The following fields appear on the Full Event Log page:

Table- 7.2 Full Event Log page

Field	Description
Total Events	Number of total events in log
Events per page	Number of events shown per page; modifiable
Page navigator	Allows paging through log
Time Since Uptime	The time the event occurred. A time of 0 is the time the system was last rebooted
Severity	The severity of the event, showing how serious event is: Information, Warning, Critical, or the event type (e.g. Connection Flow)
Source	The system module reporting the event
Description	Complete description of circumstances of event

Navigating the Event Log

The following is the description of the buttons used to navigate the event log.

The description of the keys controlling the Full Event Log page:

Table- 7.3 Viewing the Full Event Log page

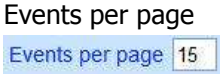
Key	Description
Page#	Indicated the number of the page that is currently viewed. The user may type the desired page # directly without the need to scroll through all pages.
Arrow in square mark	is an Enter button. It is used to effect the change of the page number entered by the user.
Arrows to the Left or Right	are used as scrolling buttons. An arrow to the right is forward (older), and an arrow to the left is backwards(newer). Note that the going forward in the file means that old events are displayed. One arrow indicates simple forward or backward. Two arrows jump directly to the first or last page.
Event Count	indicates the total number of events that are in the internal file
Events per page 	The number of events shown on a page. The user my change this value and hit the Arrow-in-a-square to activate the change. By default, there are 15 events per

Table- 7.3 Viewing the Full Event Log page

Key	Description
	page.

Configuring Event Logs

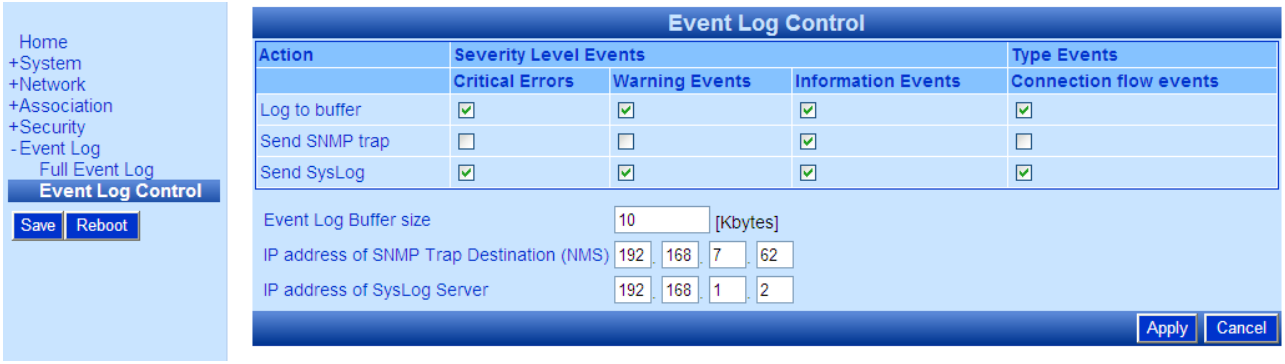
You can configure what appears in the event log, and what is sent to the external logs, such as SYSLOG and SNMP Trap Manager, through the Event Log Control page. On this page, you can control parameters relating to the event log, such as what types of events included in the log, and what method is used to collect the events.

To configure event logs

1.1. Click Event Log and then Event Log Control in the menu.

The Event Log Control page displays.

Figure 8.3 **Event Log Control Page**



The following fields appear on the Event Log Control page.

Table- 7.4 Event Log Control page

Field	Description
Action	Select the severity levels/types of events logged by each type of event information collection mechanism
Log to buffer	Events marked in this row are logged to the internal buffer

Table- 7.4 Event Log Control page

Field	Description
Send SNMP trap	Events marked in this row are sent to the SNMP trap manager
Send SysLog	Events marked in this row are sent to the SysLog server
Severity Level Events	Select the types of events to be saved to each log
Critical Errors	
Warning Events	
Information Events	
Type Events	
Connection Flow Events	Indicates whether connection flow events are saved to a log or sent to a remote server. Version 4.0 presents better reporting of connection flow, which improves understanding of clients' connectivity by System operator. Each event is accompanied by the associated client' MAC Address and connection SNR. These parameters help understanding the quality of the connection.
Event Log Buffer Size[Kbytes]	Maximum size of the internal log; events reaching log when the buffer is full overwrites over the oldest events
IP Address of SNMP Trap Destination (NMS)	The IP Address of the SNMP Server. When the unit is discovered by a WavioNet NMS server the IP is automatically changed to point to the specific NMS server.
IP Address of Syslog Server	The IP Address of the SYSLOG Server to which SYSLOG events are to be sent.
Options	
Apply	Click to have your changes take effect temporarily
Save	Click to have your changes remain in effect after a reboot
Cancel	Click to clear your changes; this is only possible if Apply or Save were not clicked

You can modify selections on this page.

Click Apply to save changes temporarily.

Click Apply and Save to have changes remain in effect after a reboot.

Chapter 8

Upgrading the System Software

This chapter describes the Wavion WBS-2400 firmware upgrade procedure, using the internal web management tool (CMT) application or TFTP commands.

Prior to upgrading, it is essential to backup your Base station configuration (refer to the relevant section in the User Manual document).

Note: In order to perform a successful upgrade session it is recommended to perform the upgrade at a time when the system is not fully utilized (e.g. at late night hours when traffic is low). This will ensure minimal interference with customer traffic and flawless firmware download performance.

Prerequisites

It is immanent that the user performing the upgrade/downgrade procedure is familiar with Wavion WBS-2400 system prior to reading and implementing the instructions in this document.

Information of the system and its operation is found in the updated manuals of the version.

As this document refers to these manuals it is highly recommended that the installer shall have the mentioned manuals at hand when performing the upgrade/downgrade procedure.

Tools and data required for upgrade:

1. Portable PC with an Ethernet port or wireless port
2. Administrator password of the unit that is to be upgraded. Default user string leaving Wavion facility is User: *admin* Pass: *admin*
3. IP address of unit. Default address of each unit leaving Wavion facility is 192.168.1.1/24 (or mask 255.255.255.0)
4. Firmware files: See table 8.1 for details
5. Unit to be upgraded

Firmware Upgrade Procedure

Note: To better reflect the value of Wavion products we are changing the name of our product family from Access Points (AP) to Wireless Base Stations (WBS), consequently the existing WS-410 product name will be changed to Wavion WBS-2400.

The new product name emphasizes the difference in architecture (Multiple Radio system) and the value to customer, superiority in performance (coverage, capacity, indoor penetration and immunity to interference) of Wavion WiFi base station over any other standard outdoor WiFi access point products available in the market.

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Note: All references in Wavion's documentation to WS-410 refer also to the WBS-2400, and vice versa. Both products are exactly the same except for the name change

Firmware upgrade can be performed using a HTTP web browser or TFTP application. Before performing the upgrade procedure, make sure you have the appropriate files on your computer, as listed in the next table:

Table- 8.1 WBS-2400 Firmware Files

Unit name	Firmware Filename
WBS-2400	W2400_T_v_4_0_1_rev_7.wj
WBS-2400-SCT	W2400_SCT_T_v_4_0_1_rev_7.wj

Verify IP connectivity to the management IP.

In order to verify the connection, PING the unit's IP address and verify that PING replies are being received.

Note: Management traffic may be VLAN tagged.

It is recommended to perform prior to upgrading procedure, software verification and to verify that we have the appropriate file with extension *.wj on your computer.

It is recommended to save unit configuration file prior to upgrading (see user manual for details).

Upload firmware file

- Verify IP connectivity to the management IP
- Verify that the IP address of the unit is known. The default IP address of a unit leaving Wavion facility is 192.168.1.1/24 with user name: admin pass: admin
- Change the IP address of the PC to be in the same subnet as the unit. For example if the units IP address is 192.168.1.1 the IP address of the PC may be 192.168.1.10
- Connect the PC Ethernet port to the WBS-2400 Unit Ethernet port using a straight or cross Ethernet cable).
- Use any Web Browser and type unit IP address (Default: http://192.168.1.1)

- Access the System upgrade area.
- Select the Unit that needs to be upgraded and choose "System Software" menu under "System" menu.

- The system software tabs display, consisting of the Software Upgrade tab for managing the system software version, and the System Configuration tab for managing the system configuration.

Figure 8.1 **System Software page**

Performing Software Upgrades using HTTP

The Software Upgrade option shows details about the current software version, and allows you to set properties required to install a new software version.

Other options:

1. Return to the factory default software
2. Backup the current version of the software
3. Return to a previously backed up version of the software.

Step 1: Set the Upgrade properties

Select the HTTP on the Software upgrade protocol.
Browse to the location of the firmware file.

Step 2: Upload the new firmware file

Press the Upgrade button.

Confirm the operation and wait for Web page to change to "Reboot the system" option.

Step 3: Reboot the system

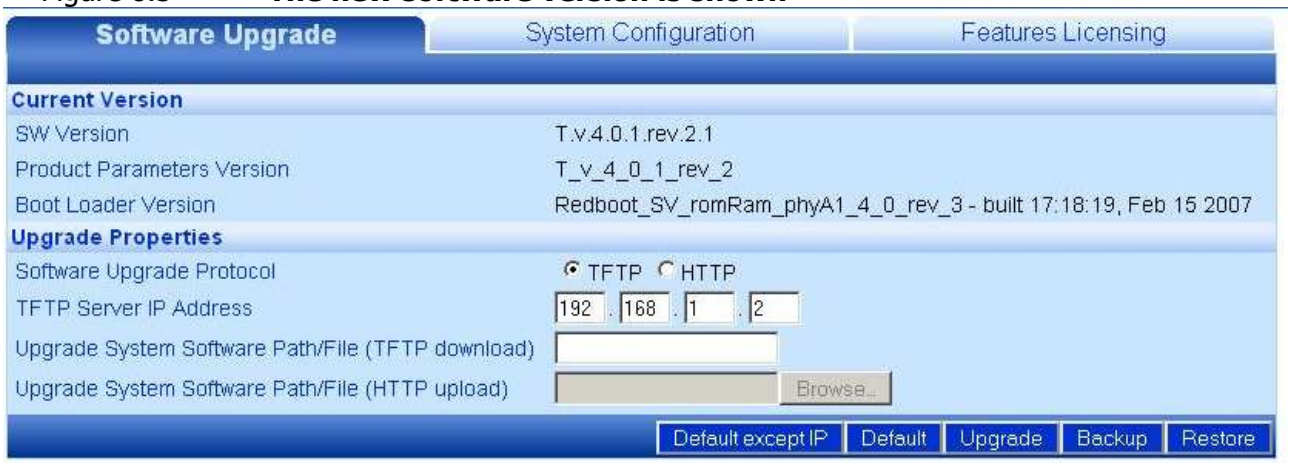
The system will come up with the new SW version.

Figure 8.2 **BST new version been uploaded successfully**

Step 4: verify a new version is running

When the upload has completed successfully and after the Reboot complete, the WEB GUI automatically refreshes the page back to SW Upgrade.

Figure 8.3 **The new software version is shown**



Note: When using Microsoft Explorer browser, restart the browser in order to clear the program's cache.

Performing Software Upgrades using TFTP

The Software Upgrade option shows details about the current software version, and allows you to set properties required to install a new software version.

Other options:

1. Return to the factory default software
2. Backup the current version of the software
3. Return to a previously backed up version of the software.

Step 1: Set the Upgrade properties

Select TFTP option on the Software upgrade protocol.
Write the IP address of the TFTP server.
Write path/name of new Firmware file in the available box (TFTP Download).

Step 2: Upload the new firmware file

Press the Upgrade button
Confirm the operation
Wait for Web page to change to "Reboot the system"

Note: It is mandatory to have a TFTP server available on the same subnet with the WBS-2400.

Step 3: Reboot the system

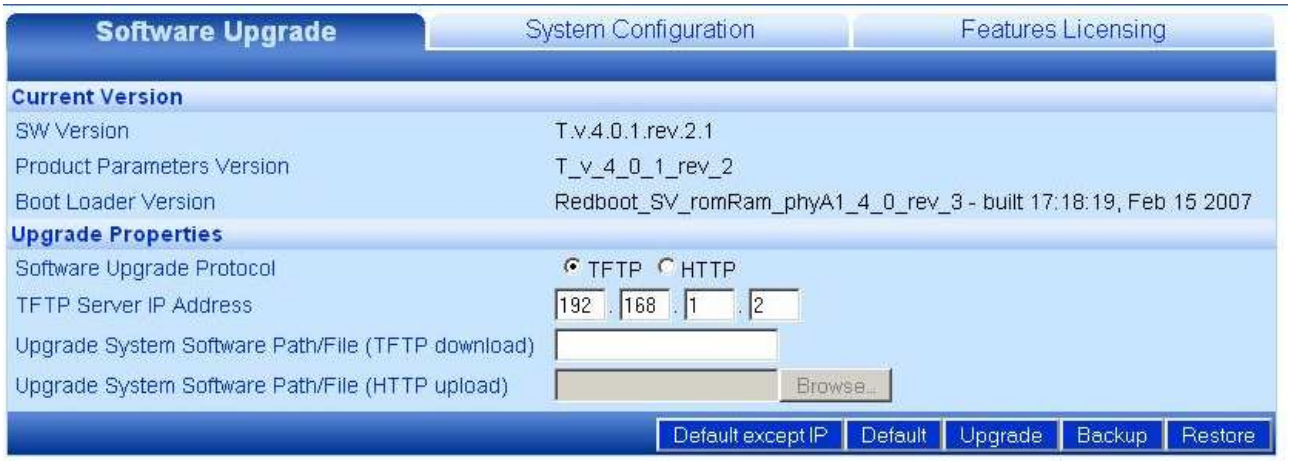
The system will come up with the new SW version.

Figure 8.4 **Reboot Window**

Step 4: verify a new version is running

After Reboot is complete, the WEB GUI automatically refresh back to SW Upgrade tab.

Figure 8.5 **The new software version is shown**



Note: When using Microsoft Explorer browser, restart the browser in order to clear the program's cache.

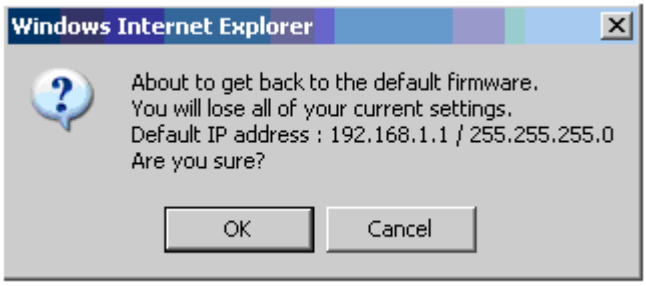
Roll back procedure

Note: You can roll back to Backup version only if you saved a backup version before

To return to the system default software version

1. Click Default or Default except IP. A warning popup displays will show up.

Figure 8.6 **Default Popup**


Windows Internet Explorer
About to get back to the default firmware.
You will lose all of your current settings.
Default IP address : 192.168.1.1 / 255.255.255.0
Are you sure?
OK
Cancel

2. Click OK, the system returns to the default software version, and default IP and mask settings (which are: 192.168.1.1 255.255.255.0).

Backing Up the Current Software Version

You can backup the software version currently installed on the system. The backup version is kept on a separate flash area on the unit itself. This can be used before upgrading to a new version with which you do not have experience.

To back up the current version of the software

- Click Backup.

The current version of the software is saved, and can be restored to the system if necessary.

Restoring the Last Saved Software Version

If you backed up a software version before upgrading to a new one, it is possible to return to the previous version.

To return to a previous system software version

- Click Restore.

The last backed up version of the system software is restored to the system.

Chapter 9

Appendix: Troubleshooting

We hope your experience with the WBS-2400 is as smooth as possible. In this section we provide tips to solve some common problems.

Basic Troubleshooting

Problem	Solution
Default user and password	User: admin Password: admin
Unable to Ping or HTTP the New Unit	• Check the Power • Is the BST Operational? Check the LED, make sure it showing Green on the Status • WBS-2400 default IP Address is 192.168.1.1 /24 mask
Client unable to acquire an IP Address from DHCP Server	• Is the BST Operational? • Check the DHCP Server. Use Static IP to test the DHCP configuration • Check for Interference. Noise level should be between -97dBm to -82dBm
Clients experiencing low throughput	• Check the Network Interfaces, 802.11b/g for Wifi activity and try to select a better channel using the Automatic Channel Selection (ACS). • Check for Interference. Noise level should be around -97dBm to -82dBm • Check the client's modulation rate e.g. 54Mbps, 48Mbps, 11Mbps....
Self Backhaul	
Link Down	• Check that both BST configured to the same Operational channel • Check that Peer BST MAC address are set to the correct value
Link is Poor	• Check that range is set to the correct value on both BST • Check that beacon period is the same for both

Problem	Solution
	BST • Check for Line of Sight
Link is Good but no data traffic	• Check that Passphrase is the same for both BST
in case of problems raising cluster links due to low SNR of the SBH links (from the sub-scan)	Try to set a different channel of the Central-BST

LED Description

AE Models

LED name	Status	Description
ETH A	OFF	No Ethernet Activity on port A
	BLINK	Ethernet Activity on port A
ETH B	OFF	No Ethernet Activity on port B
	BLINK	Ethernet Activity on port B
STATUS	GREEN, SLOW_BLINK	Initialization state
	RED,STEADY	Critical alert
	GREEN, SLOW_BLINK	Operational without connected stations
	GREEN, STEADY	Operational with connected stations
	AMBER, FAST_BLINK	Operational GENERAL_WARNING
	AMBER, SLOW_BLINK	Software RESET
	AMBER,STEADY	Hardware RESET

LED name	Status	Description
	RED, SLOW_BLINK	Factory default but IP
	RED, FAST_BLINK	Factory default
RADIO	GREEN, SLOW_BLINK	Initialization state
	RED, STEADY	Critical alert
	GREEN, SLOW_BLINK	Operational without connected stations
	GREEN, STEADY	Operational with connected stations
	AMBER, FAST_BLINK	Operational GENERAL_WARNING

AF Models

LED name	Status	Description
Ethernet Link-(L)	OFF	No Ethernet Activity
	BLINK	Ethernet Activity
STATUS-(S)	GREEN, SLOW_BLINK	Initialization state
	RED,STEADY	Critical alert
	GREEN, SLOW_BLINK	Operational without connected stations
	GREEN, STEADY	Operational with connected stations
	AMBER, FAST_BLINK	Operational GENERAL_WARNING
	AMBER, SLOW_BLINK	Software RESET
	AMBER,STEADY	Hardware RESET
	RED, SLOW_BLINK	Factory default but IP
	RED, FAST_BLINK	Factory default

LED name	Status	Description
RADIO- (R)	GREEN, SLOW_BLINK	Initialization state
	RED, STEADY	Critical alert
	GREEN, SLOW_BLINK	Operational without connected stations
	GREEN, STEADY	Operational with connected stations
	AMBER, FAST_BLINK	Operational GENERAL_WARNING